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Rate Decision Disregarded

Steel Mill Operations Increase

Pig Iron Holds Its Own

From the viewpoint of the iron trade, the Interstate Commerce Commission's decision reducing Reno, Spokane and Salt Lake rates about 20 per cent. is regarded as simply another incident in the disappointing railroad situation. The iron trade has not had anything like its normal volume of business from the railroads for many months and has managed to get along after some fashion and this new decision is not likely to restrict their orders much further. In point of fact, the necessities of the railroads are steadily increasing and the ravages of wear an dtear must be made up sooner or later, when the requisite funds will be secured in some way.

The reports from various trade centers show a continued slight increase in steel mill operations. At Pittsburgh the leading subsidiary of the Steel Corporation is doing considerably better than early in the month, operating in excess of 75 per cent. of its ingot capacity. At the same point a large independent is operating some important departments at better than 85 per cent., while another is doing about 80 per cent. Other mills, however, show considerably lower percentages, from which it is inferred that business is not distributed as uniformly as it was earlier in the year. Pittsburgh also reports that orders are slightly better this week than last. As both bookings and production have been better in July than in June, the augury is regarded as excellent for good business in the fall.

The United States Steel Corporation worked up to 72 per cent. of its steel ingot capacity last week and is scheduled at 71 per cent. this week. Its blast furnace operations are increasing, two furnaces having been added to the active list at Youngstown and one at Duquesne.

While the volume of business is showing a steady gain in finished products, the improved buying conditions are not sufficient to satisfy some producers, and prices on certain products are subject to more or less shading. This has been especially the case with regard to steel bars and sheets. It is worthy of note, however, that the leading manufacturers of steel bars are firmly maintaining the price of 1.25 cent, Pittsburgh. At large steel bar order, said to be 30,000 tons, was placed at Buffalo.

An order for 30,000 tons of steel rails is being rolled for quick delivery by the Illinois Steel Company for the Canadian Pacific, while the same railroad company has purchased 3000 tons from the Lackawanna Steel Company. Included in recent export business is a contract for 20,000 tons of structural shapes from bridge builders in Canada.

The pig iron market appears to be broadening, especially in the Central West. The malleable foun-

dries in the Chicago district have begun to close their agricultural implement contracts for the year and both the malleable and gray iron foundries are now increasing their consumption of pig iron. Buying has been slightly better, not only at Chicago but also at Cleveland, Cincinnati and Pittsburgh. A steel manufacturer near Pittsburgh is understood to have bought 15,000 tons of basic iron for delivery over the remainder of this year. From Birmingham a sale of 25,000 tons of iron to a manufacturer of cast iron pipe is reported, while numerous other transactions of considerable quantities have taken place. The continued heavy movement from furnace yards has somewhat strengthened the tone of Southern iron and it looks as if the $10 price might soon become a memory, as this price can no longer be obtained from four of the prominent Southern producing interests. The Eastern iron market shows continued firmness, with a slightly better movement. It is reported that an eastern Pennsylvania steel company has bought another 5000-ton lot of basic pig iron.

The scrap situation is becoming interesting. Prices of heavy melting steel scrap have advanced at both Philadelphia and Pittsburgh and there are some indications of a speculative tendency among dealers.

Increasing Railroad Traffic

Poor's statistics of the steam railroads of the United States, just issued for the calendar year 1910, furnish evidence of a sure and steady increase in railroad traffic per mile of road. This explains how the railroads have been able to maintain themselves so well financially, although meeting what they have assured the public is a most burdensome increase in their cost of doing business. It gives assurance also that their condition will improve steadily in the future. When the position of the railroads first came to be seriously studied, in the past two or three years, the almost unbroken increase in total earnings year by year attracted attention and was made the excuse for much criticism of the railroad attitude. On the part of the railroads a regular campaign was inaugurated to set forth the fact that the apparent increase in earnings was due, at least in very large part, to the increase in mileage, year by year, and for some time past a bureau has been maintained for the purpose of analyzing the monthly earnings statistics by referring them to a per mile basis. This method of comparison is the only safe one in studying traffic statistics. It means nothing by itself to observe that passenger traffic has increased 158 per cent., or freight traffic 224 per cent., in the 20 years from 1890 to 1910, for in the same period the total mileage of railroad has increased 52 per cent., and capital investment still more, because the investment per mile of line has increased.

While Poor's statistics give many details computed from the fundamental figures gathered, they do not show passenger or freight movement per mile of road —the density of traffic, in other words—and for the table given below we have therefore computed this item. There is shown below, for the 21 years from 1890 to 1910, inclusive, the total mileage of steam railroad reporting, the total freight ton-mileage (2,000 lb. moved one mile), and the ton-mileage per mile of road. The years indicated are the fiscal years of the roads, usually the year ended June 30, but in the case of several important systems the year ended December 31, Thus the statistics by nominal years are strictly comparable with each other, although a given one does not represent identical periods for all roads reporting.

Steam Roads and Freight Traffic.

Years.	Miles reporting.	Total ton-miles.	Ton-miles per mile of road.
1890	157,967	79,192,985,000	501,000
1891	164,262	81,210,155,000	495,000
1892	170,607	84,413,197,000	495,000
1893	173,361	90,552,087,000	523,000
1894	176,221	82,219,900,000	467,000
1895	179,154	88,567,771,000	495,000
1896	180,891	93,885,854,000	519,000
1897	181,065	97,842,569,000	540,000
1898	184,117	114,566,173,000	622,000
1899	186,224	126,991,703,000	684,000
1900	191,455	141,162,109,000	739,000
1901	194,455	148,959,303,000	767,000
1902	197,381	156,624,166,000	797,000
1903	204,668	171,290,311,000	837,000
1904	211,233	172,613,027,000	820,000
1905	214,836	187,375,622,000	873,000
1906	220,688	216,653,796,000	981,000
1907	224,386	233,137,508,000	1,039,000
1908	227,228	215,698,911,000	954,000
1909	236,892	227,198,933,000	960,000
1910	239,607	256,682,127,000	1,072,000

There has been, of course, a continuous increase in the mileage of road. The total freight traffic has not invariably increased, but the table giving figures for 21 years shows 20 years with which comparison can be made, and 16 out of those 20 years broke all previous records for freight traffic, while 12 of the 20 broke all previous records for freight traffic per mile of road.

In the 20 years the density of traffic has done a little better than double. It was 501,000 ton-miles per mile of road in 1890, and as early as 1907, 17 years later, it was 1,039,000 ton-miles, while in 1910 the 1907 record was broken, with 1,072,000 ton-miles. Obviously this increased density of traffic is the salvation of the railroads as a class. If there is only business enough to operate one train a week, it is necessary to lay the track in order to operate that one train, whereas the track will accommodate many trains a day without increasing the investment in it.

From the statistics it is safe to derive a general rule that density of freight traffic tends to double in somewhat less than 20 years. Our comparison between 1890 and 1910 does not do full justice to the rate of gain, for the reason that 1890 was a particularly good year, much better than its predecessors, and better even than the two following years, whereas 1910 was only a moderately good year in its day. To pick out the most favorable comparison in the whole period, we may observe that while the 540,000 ton-miles per mile of road in 1897 broke all previous records, the item 10 years later, in 1907, was 1,039,000, which is 92.41 per cent. gain in 10 years, or doubling in less than 11 years. It would not be fair to draw deductions from this, for the period was one of unusual expansion, but much study of statistics has shown that in general all variations from normal in American business are completed within 20 years, and 20-year comparisons are usually very trustworthy.

The density of passenger traffic has not increased as rapidly as that of freight traffic. Below are given the figures for three representative years, the figures representing passengers carried one mile, per mile of railroad reporting:

Density of Passenger Traffic.

1890	79,200
1900	85,700
1910	135,000

While the increase in density of passenger traffic has been much less than that of freight traffic, the density of passenger traffic is of itself of little consequence. Railroad men assure us that there is no money in passenger business, and that the public is constantly "demanding" better service, which eats up the possible

earnings. Whether it is impossible for the railroads to avoid complying with these "demands" is a question which might admit of some discussion, but that matter is not germane to the present subject. We observe from the statistics that the railroads do accede to the demands in large measure, for we find that the average number of passenger-miles per passenger train mile in 1890 was 42.12; in 1900, 43.22; and in 1910, 57.42; so that the number of train-miles per mile of road has increased almost as rapidly as the passenger traffic. If the railroads would haul more passengers per train they would, of course, make more money.

In the case of freight traffic this economy has been practiced. There has been a steady and rather rapid increase in the average train load—from 163.99 tons in 1890 to 274.79 tons in 1900 and 394.73 tons in 1910, which is 68 per cent. gain in the first decade and 44 per cent. in the second. Part of the increase is, of course, due to the increased density of traffic, whereby at one time a train must be run to accommodate the public, although it is not well loaded, while at a later time there has arisen sufficient traffic to give it a full load, while another part, undoubtedly the larger part, is due to better facilities in decreased grades and more powerful locomotives.

There is reason to expect that the cost of doing business will not increase in the next few years as it has in the past dozen years; it is more likely to decrease, and at any rate is surely will not increase with the same rapidity as formerly. The increase in density of traffic, on the other hand, is bound to continue, and the increase in freight train loads is certain to continue. There is opportunity, in an emergency, for the railroads to increase more rapidly the passenger train load, by holding the number of trains more nearly stationary while the total passenger traffic increases, and thus year by year the railroads should find themselves in better and better position.

The iron and steel industry is vitally interested in railroad prosperity, in seeing the railroads make good profits, for when such profits are being made extensions are undertaken and the trade has learned that such extensions involve large tonnages of material. A comparatively new source of railroad consumption of iron and steel, however, has appeared. A quarter of a century ago, when there occurred the heaviest railroad building, in point of mileage, railroad purchases were almost wholly for extensions. With the enormous increase in traffic the point has been reached where railroads wear out a great deal of material, and this must be replaced from time to time. The statistics show how great has been this increase. In considering this consumption, it matters not whether the traffic is over few or many miles of road; the point is simply that each ton of freight moved one mile does wear out a certain amount of material. From 1890 to 1900 the freight ton-mileage of the country increased 78 per cent., and from 1900 to 1910, 82 per cent., the increase in the whole 20 years being 224 per cent. This is an average rate of increase of a trifle more than 6 per cent., indicating a doubling in a trifle less than 12 years. Year by year, then, the railroads are certain to wear out more material, and, as this is part of the ordinary cost of operation, the demand for replacement material does not depend in any great part upon whether earnings are large or small. This species of railroad demand, while relatively new, has become very important.

Our Improved Foreign Trade Balance

Our foreign trade in the fiscal year just ended shows a gratifying return to the large favorable balance which characterized the years 1898 to 1908 inclusive. The balance averaged regularly more than $500,000,000 annually during those 11 years, there having been relatively small favorable balances prior to 1898. In the fiscal year 1909 the favorable balance dropped to $351,000,000, and in 1910 there was a further drop to $187,000,000. In the fiscal year 1911 the balance returned to $520,706,304, which is almost precisely the average of the 11 years mentioned, 1898 to 1908. The full statistics of the merchandise movement are as follows for the fiscal years:

	Imports.	Exports.	Balance.
1898	$616,049,654	$1,231,482,330	$615,432,676
1899	697,148,489	1,227,023,302	529,874,813
1900	849,941,184	1,394,483,082	544,541,898
1901	823,172,165	1,487,764,991	664,592,826
1902	903,320,948	1,381,719,401	478,398,453
1903	1,025,719,237	1,420,141,679	394,422,442
1904	991,087,371	1,460,827,271	469,739,900
1905	1,117,513,071	1,518,561,666	401,048,595
1906	1,226,562,446	1,743,864,500	517,302,054
1907	1,434,421,425	1,880,851,078	446,429,653
1908	1,194,341,792	1,860,773,346	666,431,554
1909	1,311,920,224	1,663,011,104	351,090,880
1910	1,557,819,988	1,744,984,720	187,164,732
1911	1,527,985,088	2,048,691,392	520,706,304

It will be observed that the large favorable balance in 1911 was effected by an increase in exports, which easily broke all previous records, exceeding 1907, the previous record year, by 9 per cent. The imports were the largest on record with the single exception of 1910, and fell short of that year by only 2 per cent.

The fiscal year 1910-11 opened very inauspiciously, July showing an unfavorable balance. The net favorable balance for the year was obtained chiefly through very heavy exports in the fall and winter of foodstuffs, cotton and oil. It must be remembered that our exports of foodstuffs are at best much less than they were prior to the last few years, and there is no prospect that they will ever reach the old time proportions. As was lucidly pointed out by James J. Hill in a series of articles some time ago, year by year we need our foodstuffs more at home and are trending toward being a wheat-importing nation instead of continuing as a great wheat-exporting nation, as we were for so many years.

The regaining of a large favorable balance of trade in merchandise comparable with those which obtained from 1898 to 1908 is not sufficient to restore our position, for the reason that the apparent favorable balance is not clear profit, a part of it being by common consent assumed to be made up of at least occasional undervaluations of imports and overvaluations of exports, while there are freights paid both ways when a fair basis would be to pay freight one way only. These items absorb larger and larger sums as the total commerce grows, and then there are other movements which our excess of exports must pay for, and as the country grows these adjustments may be presumed to grow. Accordingly, the maintenance of the same apparent favorable balance in merchandise trade, when the total movement greatly increases, is not as satisfactory as might appear at first glance. In the three years 1898, 1899 and 1900 the total movement, imports plus exports, averaged $2,000,000,000; in 1911 the total was $3,577,000,000, or 79 per cent. more, and there is considerable ground for arguing that merely to maintain our position the apparent favorable balance should have increased in the same ratio. On the basis of those three years and a 79 per cent. increase this would call for a balance of no less than $1,000,000,000 in 1911.

Correspondence

Ferrotitanium and Its Use

To the Editor: In *The Iron Age* of June 22, 1911, page 1538, appeared an article by the manager of sales of the Goldschmidt Thermit Company, describing the various alloy products of his company. Several paragraphs are devoted to ferrotitanium, which is described as probably the most important alloy at the present time. The writer wishes to take exception to the part of this article quoted below:

This alloy is a light grayish metal, is hard and brittle in character, and contains from 20 to 25 per cent. titanium, 3 to 5 per cent. aluminum and the rest iron. The other impurities are so small in proportion as to be negligible. The aluminum should not be regarded as an impurity, as it helps the solubility of the alloy materially when added to steel or iron. Of course, being produced by the thermit reaction, the alloy is absolutely free from carbon, which is a very great advantage, as wherever carbon is present it combines with the titanium to form titanium carbide, which dissolves with great difficulty in iron or steel, and considerable of the titanium is, therefore, wasted.

It can easily be shown that, where a ferrotitanium alloy contains as much as from 5 to 8 per cent. carbon, at least 15 to 20 per cent. of the titanium content is wasted in the form of titanium carbide. In the case of an alloy produced by the thermit reaction all this waste is entirely eliminated, while an additional advantage is gained through the higher specific gravity of the thermit product over that produced in the electric furnace, or by other methods. This higher specific gravity is of considerable importance as it permits of the alloy sinking into the iron or steel treated, and avoids any danger of its floating on top and being wasted in the slag.

The writer's experience with ferrotitanium alloy, which has been considerable, has been chiefly gained with the so-called 10 per cent. and 15 per cent. alloys of the Titanium Alloy Mfg. Company which he can thoroughly recommend. It is by wide experience with these alloys, especially the 10 per cent. one, that the demand for titanium-treated iron and steel has been created in this country, and has grown to its present large proportions. Their average analysis and specific gravity have proved to be within the following limits:

	Ten per cent. alloy.		Fifteen per cent. alloy.	
Titanium, per cent	10.0 to 12.0		14.9 to 16.0	
Combined carbon, per cent	0.1	0.25	0.1	0.25
Graphitic carbon, per cent	5.75	7.25	5.75	7.25
Silicon, per cent	0.8	1.05	0.9	1.10
Manganese, per cent	0.12	0.15	0.12	0.15
Sulphur	traces		traces	
Phosphorus, per cent	0.06	0 08	0.065	0.09
Specific gravity	6.20	6.40	6.15	6.35

As a contrast to these analyses may be given some results obtained on two samples of the Goldschmidt alloy:

	Sample 1.	Sample 2.
Titanium, per cent	23.10	21.08
Silicon, per cent	7.82	1.88
Aluminum, per cent	6.36	9.01

The specific gravity varied from 6.20 to 6.30.

The Presence of Aluminum

The first point to be taken up is that of the aluminum, which is unavoidably present in considerable quantities in the Goldschmidt alloy. In one sense its presence may be beneficial, but in another it is extremely harmful. It may help the solubility of the low carbon alloy, when added to the molten bath, through lowering its fusion point, and in this respect its action is necessary and helpful. After fusion most of the aluminum will be oxidized to dry powdery alumina, which will tend to slag off, together with the oxide of titanium and other slag-making material. It will decrease the fusibility of the slag, making it liable to be held in the metal, and so tend to defeat one of the chief advantages of using ferrotitanium, namely a resultant clean solid steel or iron. With regard to the carbon, the analyses show that in the 10 per cent. and 15 per cent. alloys practically all of it is in the free or graphitic state. The amount of titanium carbide present, if any, must be very small.

Titanium Decomposes Carbide of Iron

In these alloys titanium seems to act a good deal like silicon, decomposing the carbide of iron and precipitating free carbon as graphite. This view is supported by the results of an experiment recently made by the writer. A ladle of iron for making malleable castings was treated with an addition of 10 per cent. alloy equal to 0.1 per cent. metallic titanium. The original iron gave castings showing a white fracture, with a little graphite in the center. The titanium-treated metal, when cast in a similar mold made from the same pattern, showed a gray fracture, with a white border between ⅛ and ½ in. deep round the outside.

In this case, therefore, the titanium precipitated graphite in the body of the metal, giving the gray fracture. If manganese or vanadium had been added, either would in part at least have combined with the iron carbide, giving double carbides. The titanium, however, works entirely differently, showing no tendency to form a carbide but decomposing the carbide already present, forming graphite, with which it also shows no tendency to combine.

It is extremely unlike and improbable that, even at the highest temperatures reached in the steel-making processes, this action will be reversed, and titanium carbide formed. Even if the temperature were high enough for this latter reaction, there would remain the much greater affinity of iron for carbon to be taken into consideration.

It is much more likely that, when the 10 per cent. or 15 per cent. alloy is added to a bath of molten steel, the alloy quickly dissolves because of its low melting point; part of the graphite unites with iron, forming carbide of iron, while a part rises quickly to the surface because of its low specific gravity and is lost in the slag. This opinion is supported by results in practice, for the carbon in the final steel, when the 10 per cent. or 15 per cent. alloy is used, is generally slightly raised, but not to the amount expected if all the graphite were absorbed.

The point which it is desired to bring out is that absolutely no titanium is prevented from doing its useful work through the combination of titanium and graphite, and the formation of titanium carbide.

The matter of the specific gravity is answered by the results given previously in this article. It must be remembered that the Goldschmidt alloy contains a considerable amount of aluminum and also less iron than the 10 per cent. or 15 per cent. domestic alloys, both of which facts will tend to lower its specific gravity.

G. B. WATERHOUSE, PH.D.

BUFFALO, N. Y., July 20, 1911.

Manning, Maxwell & Moore Changes

At a meeting of the directors of Manning, Maxwell & Moore, Inc., July 23, the resignation of Colby M. Chester, Jr., as secretary and treasurer was accepted and J. H. Evans was elected a director and to fill the vacant offices. Mr. Evans is the son of the late Sir Francis Evans of England, and since coming to the United States has been connected with the Guaranty Trust Company and the Central Trust Company of New York City.

Henry Evans, president of the Continental Insurance Company and the Fidelity-Phenix Fire Insurance Company, was elected chairman of the executive committee. Mr. Evans states that he assumes this responsibility at the urgent request of his friend and relative, Charles A. Moore, the president of the company, who, as the result of many years of hard work, is taking an extended rest but expects in the fall to return to America. There is absolutely no change in the ownership of the stock of the company, Mr. Moore still retaining his controlling interest. No further changes in the official force of the corporation are expected. The resignation of Mr. Chester is officially explained as resulting from Chairman Evans's insistence that, as Mr. Moore's representative, he should control the office of treasurer.

The American Steel & Wire Company, Pittsburgh, has received from the American Bridge Company, Ambridge, Pa., two new steel barges, the Donora and Duquesne, for use in transporting its products from its plants to Southern markets. The barges are 200 x 36 ft., and, when loaded, draw from 9 to 10 ft. of water. The contract calls for 10 of these vessels.

The Lebanon Valley Iron & Steel Company

The Lebanon Valley Iron & Steel Company, Lebanon, Pa., has increased its capital stock from $1,000,000 to $2,000,000. William C. Sproul, Chester, Pa.; Burrows Sloan and Felton Bent, Philadelphia, Pa., and W. A. Stanton, New York, have recently taken an interest in the company. H. H. Light will continue as president, and Felton Bent has been elected vice-president. With the increased funds available the capacity for the manufacture of bolts and nuts at the Lebanon plant will be doubled. A large number of bolt and nut machines are to be installed, and a new 8-in. mill will be added to the rolling equipment.

Under the present plan, the plant of the Duncannon Iron Company, Duncannon, Pa., will be taken over by the Lebanon Valley Iron & Steel Company and operated as its Duncannon department, and the manufacture of high-grade puddled specification iron, in all sizes of flats, rounds and squares, muck-bar and finished iron will be conducted as was previously done by that concern. Two additional finishing mills will be added to the Duncannon plant, while the cut-nail department, with a capacity of 3000 kegs per week, will be put in operation. A water course on the property, known as Sherman's Creek, will be developed later for power purposes. The proposed power plant will be of 4000 hp.

New Steel Works in Japan

A few notes regarding the recently established Nippon Steel Works, at Muroran, in the island of Hokkaido, Japan, were given by T. Haga in the Mining and Scientific Press, of San Francisco, in the issue of July 15. It appears that when Government ownership of railroads was undertaken in 1907, an effort was made to gain Government financial assistance to augment the released funds of the Hokkaido Colliery & Steamship Company for the purpose of erecting steel works and thus check the importation of iron and steel. The industry seems to be chiefly important in its relation to warships and ordnance, and the original scheme failing, the Japanese capital was combined with capital obtained through Armstrong & Co., and Vickers, Son & Maxim, Ltd., of England.

The works were established at Muroran partly because of proximity to coal mines and partly because of ample facilities "to lease the space for the navy and army departments." The plant, which it is expected will be completed in August, is being erected under the control of Vice-Admiral Yamauchi, and many of the army engineers in charge and also the mechanics were sent to England to study the operation of steel works. The capital is 15,000,000 yen (about $7,500,000), fully paid, half provided for each party. In addition about $5,000,000 in bonds were issued. Of the total of $12,500,000, about $10,500,000 is to be spent for construction work, leaving $2,000,000 for working capital.

Quite a number of the copper wire manufacturers, recently indicted in New York for a violation of the Sherman anti-trust act two or three years ago, appeared in the United States Circuit Court July 25, and, having entered the plea of nolo contendere, were each fined $1,000 on the first indictment and $100 additional for each of the other eight indictments. In imposing these fines the judge said: "Congress has declared that combinations in restraint of trade shall not exist. It seems to me I am not going out of the way when I say that just what was meant by this law has remained in considerable uncertainty up to this time. We know exactly or very nearly what it means, and from this time on there will be no excuse, but I feel justified in looking upon what has occurred in the past in this light, and therefore I certainly regard this as calling for nothing except a proper vindication of the law by a fine."

The Hopkinson Machine Company, Springfield, Mass., manufacturer of the Hopkinson drill press vise, has recently disposed of this branch of its business to the Skinner Chuck Company, New Britain, Conn. The latter company already manufactures drill press vises, but will, with the new line of vises, increase the number of sizes it has to offer.

The Schlieper-Daae Company.—John E. Schlieper and R. Daae, mechanical engineers, have organized the Schlieper-Daae Company, 714 Ferguson Building, Pittsburgh. Mr. Schlieper was formerly connected with James P. Witherow, having direct charge of steel plant and blast furnace work, then president of the Schlieper Engineering Company, and afterward general manager of the Pittsburgh Feed Water Heater Company. Mr. Daae was for some years connected with S. V. Huber as designing engineer of continuous mills, later having charge of construction of the rail mill of the Tennessee Coal, Iron & Railroad Company, and afterward taking the position of chief engineer of the Monterey Iron & Steel Company, Monterey, Mexico. The Schlieper-Daae Company will design blast furnaces, steel works, rail, continuous, merchant, sheet and tin mills, galvanizing plants, pipe mills, steam and hydraulic machinery, etc. It controls patents on soaking pit covers and a gas producer and has a machine to cast and press steel car wheels, embodying the latest ideas. The company has just completed plans and specifications for a large new sheet and tin plate mill.

The Washington Steel & Ordnance Company has purchased and taken over the steel works at Giesboro Manor, in the District of Columbia, heretofore owned and operated by the Firth-Sterling Steel Company as the Ordnance Works of that company. The officers of the Washington Steel & Ordnance Company are as follows: Lewis J. Firth, president; James W. Kinnear, vice-president; Harry F. Clark, secretary and treasurer. The directors are as follows: Lewis J. Firth, Florence, Italy; James W. Kinnear, Eben B. Clarke, James E. Porter, Pittsburgh, Pa.; William A. Burton, Sheffield, England; Alexander G. McKenna, Charles V. Wheeler, Washington, D. C. The management of the works remains unchanged and the business will be conducted without interruption.

The Metz Mfg. Company, Canton, Ohio, has been incorporated with a capital stock of $25,000 and has opened a factory on South Walnut street for the manufacture of porch swings, camp chairs, store window fixtures and other wood specialties. Officers elected are as follows: President and general manager, Charles H. Metz; vice-president, J. R. Cokgill; secretary and general salesmanager, Aaron L. Lewis; treasurer, M. V. H. Johnston. The company has taken over the business established by C. H. Metz.

The National Tube Company, Pittsburgh, reports through its president, W. B. Schiller, that, beginning August 1, the six-day-week plan will be put into effect at all the works of the concern and its allied companies. The features of the plan are that no employee shall work more than six days continuously or more than 12 hours straight a day. As to newspaper reports referring to a congressional committee investigating the working conditions at the plant of the company at McKeesport, Pa., the concern states that no such committee has called for any information.

C. M. Neeld, formerly general manager of the Rankin Works of the McClintic-Marshall Construction Company, has recently formed the C. M. Neeld Construction Company, with offices at 1418 Oliver Building, Pittsburgh. The company will handle buildings complete, erect bridges, viaducts and concrete work, making a specialty of reinforced concrete.

The Bessemer Coke Company, Pittsburgh, has commenced work at its Griffen Works, near Masontown, Pa., on 200 new rectangular coke ovens, for which Frank E. Gebhart, chief engineer of the company, prepared plans some time ago. Some of the older beehive ovens have been torn out to make room for the new. They will be ready for operation about October 1.

The American Sheet & Tin Plate Company has in the last two weeks placed in operation eight additional sheet mills, six of them being at its Ætna-Standard Works, Bridgeport, Ohio. Eight additional tin mills at its American Works, Ellwood, Ind., have also been started up.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	July 26 1911.	July 19 1911.	June 28 1911.	July 27 1910.
PIG IRON, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	$15.00	$15.00	$15.00	$16.25
Foundry No. 2, Valley furnace	13.50	13.50	13.50	14.25
Foundry No. 2 Southern, Cincinnati	13.25	13.25	13.25	14.75
Foundry No. 2, Birmingham, Ala.	10.00	10.00	10.00	11.50
Foundry No. 2, at furnace, Chicago*	*14.50*	15.00	15.00	16.50
Basic, delivered, eastern Pa.	**14.50**	14.25	14.50	15.50
Basic, Valley furnace	13.00	13.00	13.00	14.50
Bessemer, Pittsburgh	15.90	15.90	15.90	16.40
Gray forge, Pittsburgh	13.90	13.90	13.90	14.40
Lake Superior charcoal, Chicago	16.50	16.50	16.50	18.50
COKE, CONNELLSVILLE, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	**1.50**	1.40	1.40	1.55
Furnace coke, future delivery	**1.65**	1.55	1.60	1.80
Foundry coke, prompt shipment	**1.85**	1.80	1.80	2.15
Foundry coke, future delivery	2.00	2.00	2.10	2.25
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	21.00	21.00	21.00	24.50
Forging billets, Pittsburgh	26.00	26.00	26.00	30.00
Open hearth billets, Philadelphia	23.40	23.40	23.40	28.50
Wire rods, Pittsburgh	27.00	27.00	27.00	29.00
OLD MATERIAL, Per Gross Ton:				
Iron rails, Chicago	14.00	14.00	14.00	16.50
Iron rails, Philadelphia	17.50	17.50	16.50	18.00
Car wheels, Chicago	12.50	12.50	12.50	14.75
Car wheels, Philadelphia	13.00	13.00	13.00	14.00
Heavy steel scrap, Pittsburgh	**13.25**	13.00	13.00	14.00
Heavy steel scrap, Chicago	10.50	10.50	10.25	12.25
Heavy steel scrap, Philadelphia	**13.50**	13.25	13.00	14.00
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Refined iron bars, Philadelphia	1.27½	1.27½	1.27½	1.42½
Common iron bars, Pittsburgh	1.25	1.25	1.25	1.50
Common iron bars, Chicago	1.20	1.20	1.20	1.40
Steel bars, Pittsburgh	*1.20*	1.25	1.25	1.45
Steel bars, tidewater, New York	*1.36*	1.41	1.41	1.61
Tank plates, Pittsburgh	1.35	1.35	1.35	1.40
Tank plates, tidewater, New York	1.51	1.51	1.51	1.56
Beams, Pittsburgh	1.35	1.35	1.35	1.40
Beams, tidewater, New York	1.51	1.51	1.51	1.56
Angles, Pittsburgh	1.35	1.35	1.35	1.40
Angles, tidewater, New York	1.51	1.51	1.51	1.56
Skelp, grooved steel, Pittsburgh	1.25	1.25	1.25	1.50
Skelp, sheared steel, Pittsburgh	1.35	1.35	1.35	1.60
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.00	2.00	2.00	2.25
Wire nails, Pittsburgh†	1.70	1.70	1.70	1.70
Cut nails, Pittsburgh†	1.60	1.60	1.60	1.70
Barb wire, galv., Pittsburgh†	2.00	2.00	2.00	2.00
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	12.75	12.75	12.87½	12.62½
Electrolytic copper, New York	**12.60**	12.55	12.62½	12.50
Spelter, St. Louis	**5.60**	5.57½	5.45	5.05
Spelter, New York	**5.80**	5.75	5.65	5.20
Lead, St. Louis	**4.45**	4.40	4.35	4.25
Lead, New York	4.50	4.50	4.50	4.40
Tin, New York	42.00	42.00	45.00	33.25
Antimony, Hallett, New York	8.00	8.00	8.25	8.00
Tin plate, 100-lb. box, New York	$3.94	$3.94	$3.94	$3.84

* The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

† These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought boiler tubes.

Structural Material.—I-beams and channels, 3 to 15 in., inclusive, 1.35c. to 1.40c., net; I-beams over 15 in., 1.45c. to 1.50c., net; H-beams over 18 in., 1.50c. to 1.55c.; angles, 3 to 6 in. inclusive, ¼ in. and up, 1.35c. to 1.40c., net; angles over 6 in., 1.45c. to 1.50c. net; angles, 3 in. on one or both legs, less than ¼ in. thick, 1.40c., plus full extras as per steel bar card effective September 1, 1909; tees, 3 in. and up, 1.40c., net; zees, 3 in. and up, 1.35c. to 1.40c., net; angles, channels and tees under 3 in., 1.40c., base, plus full extras as per steel bar card of September 1, 1909; deck beams and bulb angles, 1.65c. to 1.70c., net; hand rail tees, 2.45c.; checkered and corrugated plates, 2.45c., net.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.35c. to 1.40c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge, extra	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over

TERMS—Net cash 30 days.

Sheets.—Makers' prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, U. S. standard gauge, 1.40c.; Nos. 9 and 10, 1.50c.; Nos. 11 and 12, 1.55c.; Nos. 13 and 14, 1.60c; Nos. 15 and 16, 1.70c. One pass, cold rolled, box annealed sheets, Nos. 10 to 12, 1.65c.; Nos. 13 and 14, 1.70c.; Nos. 15 and 16, 1.75c.; Nos. 17 to 21, 1.80c.; Nos. 22, 23 and 24, 1.85c.; Nos. 25 and 26, 1.90c.; No. 27, 1.95c.; No. 28, 2c.; No. 29, 2.05c.; No. 30, 2.15c. Three pass, cold rolled sheets, box annealed, are as follows: Nos. 15 and 16, 1.85c.; Nos. 17 to 21, 1.90c.; Nos. 22 to 24, 1.95c.; Nos. 25 and 26, 2c.; No. 27, 2.05c.; No. 28, 2.10c.; No. 29, 2.15c.; No. 30, 2.25c. Galvanized sheets, Nos. 10 and 11, black sheet gauge, 2c.; Nos. 12, 13 and 14, 2.10c.; Nos. 15, 16 and 17, 2.25c.; Nos. 18 to 22, 2.40c.; Nos. 23 and 24, 2.50c.; Nos. 25 and 26, 2.70c.; No. 27, 2.85c.; No. 28, 3c.; No. 29, 3.10c.; No. 30, 3.30c. All above prices are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½ in. corrugations:

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	....	$2.40	23	$2.40	$3.50
28	$1.40	2.55	22	2.60	3.70
27	1.55	2.60	21	2.80	4.05
26	1.65	2.65	20	3.05	4.35
25	1.85	3.05	18	4.05	5.70
24	2.10	3.15	16	4.90	6.50

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 1, 1910:

	Steel Black.	Steel Galv.	Iron Black.	Iron Galv.
Butt Weld.				
1 to 1½ in	..	..	49	43
½ in.	75	63	71	59
¾ to 1½ in	79	69	75	65
2 to 3 in	80	70	76	66
Lap Weld.				
2 in.	76	66	72	62
2½ to 4 in	78	67	74	64
4½ to 6 in	77	67	73	63
7 to 12 in	75	59	71	55
13 to 15 in	51½	..	..	..
Butt Weld, extra strong, plain ends, card weight.				
½, ¾, ⅞ in	69	59	65	55
½ in.	74	68	70	64
¾ to 1½ in	78	72	74	68
2 to 3 in	79	73	75	69

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Lap Weld, extra strong, plain ends, card weight.				
2 in.	75	69	71	65
2½ to 4 in.	77	71	73	67
4½ to 6 in.	76	70	72	66
7 to 8 in.	69	59	65	55
9 to 12 in.	64	54	60	50
Butt Weld, double extra strong, plain ends, card weight.				
½ in.	64	58	60	54
¾ to 1½ in.	67	61	63	57
2 to 3 in.	69	63	65	59
Lap Weld, double extra strong, plain ends, card weight.				
2 in.	65	59	61	55
2½ to 4 in.	67	61	63	57
4½ to 6 in.	66	60	62	56
7 to 8 in.	59	49	62	56

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld
2, 2½ to 4 in. ..... Lap Weld

} will be sold at two (2) points lower basing (higher price) than merchants or card weight pipe. Butt or lap weld, as specified.

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel boiler tubes to jobbers in carloads are as follows:

	Steel.
1¾ to 2¼ in.	65
2½ in.	67½
2¾ to 3¼ in.	70
3½ to 4½ in.	72½
5 to 6 in.	65
7 to 13 in.	62½

Less than carloads to destination east of the Mississippi River will be sold at delivered discounts for carload lowered by two points for lengths 22 ft. and under; longer lengths f.o.b Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $27. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, $1.50; galvanized, $1.80. Carload lots, to retailers, annealed, $1.55; galvanized, $1.85. Galvanized bar wire, to jobbers, $2; painted, $1.70. Wire nails, to jobbers, $1.70.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.

No.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized	1.95	2.00	2.05	2 10	2.20	2.30	2.70	2.80

Market and Stone Wire in Bundles, Discount from Standard List.

Bright and Annealed:	
9 and coarser	80
10 to 18	80 and 10
19 to 26	80 and 10 and 2½
27 to 36	80 and 5
Galvanized:	
9 and coarser	75 and 10
10 to 16	75 and 10
17 to 26	72½ and 10
27 to 36	72½
Coppered or Liquor Finished:	
9 and coarser	75 and 10
10 to 26	75 and 10
27 to 36	70 and 10 and 5
Tinned:	
6 to 18	75 and 10 and 10

Pittsburgh

PITTSBURGH, PA., July 26, 1911.—(*By Telephone.*)

Pig Iron.—The pig iron market has been quiet but firm. The local foundries do not need much iron as they are running light, there being little demand for rolling mill machinery. The most important inquiry for foundry iron is that of the Westinghouse Electric & Mfg. Company. This company will possibly buy within the next week for the fourth quarter, and possibly the first quarter also. A Sharon consumer is understood to have bought 15,000 tons of basic iron for delivery over the remainder of the year, while an Allegheny Valley steel works has taken 2000 tons of basic for early delivery. The extended delivery iron is understood to have been at slightly above $13, Valley furnace, and prompt iron at a shade below. The Colonial Steel Company was inquiring for 6000 tons of basic, delivery over the last five months of the year, but yesterday afternoon its directors met and decided not to buy for the present, as the iron is not needed immediately. We quote as follows: Bessemer, $15; basic, $13 for early delivery, and $13.25 for extended delivery; No. 2 foundry, $13.50 to $13.75; malleable, $13.25 to $13.50; gray forge, $13, all at Valley furnace, the freight rate to Pittsburgh being 90c. per ton.

Steel.—Sheet bar deliveries in July on contracts promise to prove considerably heavier than in June, but billet deliveries are showing a decrease. There is no buying of moment in the open market. We quote Bessemer and open-hearth billets, 4 x 4 in., and up to but not including 10 x 10 in., $21, base, and sheet and tin bars in 30-ft. lengths, $22; 1½-in. billets, $22; forging billets, $26, base, usual extras for sizes and carbons—all prices being f.o.b. Pittsburgh or Youngstown district, with freight to destination added.

(*By Mail.*)

Steel mill operations this week are slightly heavier on an average than last week. The local subsidiary of the Steel Corporation is doing materially better than early in the month and is operating in excess of 75 per cent. of its ingot capacity, which is better than operations in June, those averaging about 72 per cent. One large independent is operating some important departments at better than 85 per cent., while another is doing about 80 per cent. Others show considerably lower percentages, from which it may be inferred that the business is not distributed as uniformly as it was earlier in the year. On the whole orders are slightly better this week than last, and operations are somewhat better, while the prospects are that when results are counted up for the month of July it will be found that both bookings and production have been better in July than in June. Considering that June showed a material improvement over April or May, while July is normally a quiet month, the augury is excellent for good business in the fall. It is pointed out that with so much uncertainty from a variety of causes, particularly the confusion of thought engendered by the investigations and prosecutions, all consumers are buying only from hand to mouth and much business must be accumulating which will be let loose as soon as a more settled state of affairs appears. The continued maintenance of the present schedule of prices on the leading steel products has become the subject of a little doubt on account of cutting which has occurred in steel bars, chiefly for the implement trade. This, however, it is believed will blow over, as the 1.25c. price on steel bars is still regarded as the market, deviations having been made only on certain agricultural implement contracts which used to go regularly at a concession, and in the case of a few lots to other buyers for prompt shipment when the tonnage and specifications were particularly attractive.

Ferromanganese.—Representatives of importers of ferromanganese have uniform instructions to quote this material at $37, Baltimore, both for prompt delivery and for delivery through the first quarter of next year, and it is intimated that offers at lower prices will not be seriously considered. These instructions have been promulgated only in the past few days and the new price has not been seriously tested. We therefore quote as the uniform asking price $37, Baltimore, for prompt and forward delivery, freight to Pittsburgh being $1.95.

Ferrosilicon.—The market has been quiet, with prices unchanged. We quote 50 per cent. at $51.50 to $52, Pittsburgh, for delivery over the second half of the year, and blast furnace ferrosilicon as follows: 10 per cent., $22; 11 per cent., $24 and 12 per cent. $25, f.o.b. cars Ashland and Jisco furnaces.

Muck Bar.—No important developments have occurred in muck bar, the market being rather quiet. We quote best grades of all-pig bar, delivered Pittsburgh, at $28.50 to $29.

Skelp.—The market continues without special development. We quote grooved steel skelp at 1.25c.; sheared steel skelp at 1.35c.; grooved iron skelp at 1.50c. to 1.60c., and sheared iron skelp at 1.70c. to 1.75c., usual terms, all for delivery at consumers' mills in the Pittsburgh district.

Wire Rods.—The market has been quiet as regards fresh sales, consumers being well covered by existing contracts. We quote Bessemer, open hearth and chain rods, at $27, Pittsburgh.

Steel Rails.—The local rail mill continues to run at a good gait in comparison with operations earlier in the year, a considerable part of the output being export rails and light rails. Prices on light rails are as follows: 12-lb., 1.25c.; 16, 20 and 25-lb., 1.21c. to 1.25c.; 30 and 35-lb., 1.20c. and 40 and 45-lb., 1.16c. These prices are f.o.b. at mill, plus freight, and are the minimum of the market in carload lots, small lots being sold at a little higher price. Standard sections are held at 1.25c. per lb. for Bessemer.

Plates.—The market is rather quiet, buying being only for immediate requirements. Some of the smaller mills continue to shade the regular price of 1.35c. by $1 a ton in order to get desirable orders, but the large mills are adhering to the 1.35c. price. No important

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car orders have been booked in the past fortnight, although inquiries for nearly 15,000 cars have been hanging fire for several weeks. We quote plates, ¼ in. and heavier, at 1.30c. to 1.35c., Pittsburgh, the lower price being made only by smaller mills and on a limited range of sizes.

Bars.—The market has been somewhat irregular of late on account of cutting which started after a large part of the agricultural implement tonnage had been placed under contract at 1.25c. Several contracts have been made with agricultural implement interests at 1.20c., Pittsburgh, for the manufacturing season, and in one or two cases a limited tonnage has been offered on contract on the basis of 1.15c., Pittsburgh. These special prices were made only in the West, where the delivery price would figure out a good mill price at Western mill. Pittsburgh mills have in no case sold at less than 1.20c., and at this price only in a few instances either on desirable contracts with agricultural implement interests, to meet competition, or on small prompt lots to other buyers, when the specifications and tonnage were particularly desirable. The general price continues to be 1.25c., Pittsburgh, but it is not entirely certain that this price will hold indefinitely, a great deal depending on the volume of specifications. These have been fairly good of late, and bar mills are running better than they were. Practically all the implement business has now been placed and the fact that a part of it went at a concession is not regarded as marking down the general market, since in years past the agricultural implement interests were uniformly given a concession. Iron bars are rather quiet and remained quotable at 1.25c. to 1.30c., Pittsburgh.

Rivets.—The market shows no particular change, and we quote structural rivets at 1.70c. to 1.75c. and boiler rivets at 1.80c. to 1.85c., these prices being shaded only on the most desirable business.

Structural Material.—Specifications to the mills from the structural shops continue good, the latter being in almost full operation and doing better than at any previous time this year. We quote beams and channels up to 15-in., at 1.35c., Pittsburgh.

Wire Products.—Some of the wire mills are running a little better than formerly, but partly on stock. Prospects for the fall trade, which will open in about 30 days, are regarded as good. Prices are well maintained and we continue to quote: Galvanized barb wire, $2 per 100 lb.; painted, $1.70; annealed fence wire, $1.50; galvanized, $1.80; wire nails, $1.70, and cut nails, $1.60, all f.o.b. Pittsburgh, with full freight added to point of delivery.

Shafting.—Consumers continue to buy only from hand to mouth, and the total volume of business is only moderate, although regarded as fairly good for the season. We quote regular discounts at 60 per cent. off in carload lots and 55 per cent. in less than carloads, delivered in base territory. These prices, however, continue to be shaded on attractive business.

Spelter.—The market has continued to grow firmer, and we note sales of 50 tons to-day at 5.75c., delivered Pittsburgh, equal to 5.62½c. East St. Louis.

Hoops and Bands.—Orders for hoops have increased and are regarded as very satisfactory. The buying is entirely for immediate consumption, which is heavy, particularly in cooperage stock. The cotton tie season has been a good one, the domestic mills selling fully as large a tonnage as last year, while if the cotton crop turns out as large as expected imports are likely to be slightly heavier than last year. We quote hoops at 1.40c. and bands at 1.25c., extras on the latter as per the steel bar card.

Merchant Steel.—Buying is only of moderate volume and prices continue to be shaded, regular quotations being as follows: Iron finished tire, ½ x ½-in. and heavier, 1.40c., base; under these sizes, 1.55c.; planished tire, 1.60c.; channel tire, 1.80c., base; toe calk, 1.90c.; flat sleigh shoe, 1.55c.; concave or convex, 1.75c.; cutter shoes, tapered or bent, 2.25c.; spring steel, 2c.; machinery steel, smooth finish, 1.90c.

Sheets.—The sheet mills are operating a trifle heavier this week than last, there being close to 75 per cent. of the total number in operation. New buying is not active for forward delivery, but small orders are making up an excellent tonnage. Prices are being well maintained, except that occasionally some Ohio mills are giving away their freight advantage over Pittsburgh in selling for Western shipment.

Tin Plates.—The American Sheet & Tin Plate Company has put 25 or 30 additional tin mills in operation this week and is operating about 180 of its 235 tin mills, or more than 75 per cent. The independents are also operating to slightly better advantage, between 75 and 80 per cent. of the total being in operation. Specifications for tin plate are excellent considering the season, the demand being somewhat better than was expected. The prospect is that the mills will be able to run at the present gait for the next 30 days. The market is strictly held on the basis of $3.70, Pittsburgh, for 100-lb. coke plates.

Merchant Pipe.—The Ohio Fuel Supply Company is understood to have placed the 26 miles of 16-in. line pipe for which it has been in the market for some time, also an order for five miles of 12-in. The Philadelphia Company has taken six miles of 3-in. iron tubing. Merchant pipe buying continues to be from hand to mouth and does not make a large weekly aggregate. Regular discounts in effect on iron and steel pipe are given on a previous page.

Boiler Tubes.—Buying continues to be of a strictly hand-to-mouth character, consumers having little confidence in the market on account of the continued shading, as the regular discounts have been nominal for a long time.

Iron and Steel Scrap.—Dealers have continued to bid freely for scrap, more freely than consumers, and the market is somewhat stiffer in consequence. A great deal of scrap is being held back by producers in the expectation of higher prices. The market has not learned yet what became of the lettings early in the month of the Pennsylvania Railroad and the Baltimore & Ohio, bids at the ordinary market failing to bring out the material. Sales aggregating about 5000 tons of heavy melting steel have been made to consumers at Sharon and down the Ohio River, chiefly at $13.25, although a small tonnage was sold at $13. It is believed that considerably more material could have been sold at $13.25, but dealers find difficulty in accumulating material to sell at this rate, and would want $13.50 for any important tonnage. We revise prices slightly, as follows, per gross ton, f.o.b. Pittsburgh:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery.	$13.25 to $13.50
No. 1 foundry cast	13.25 to 13.50
No. 2 foundry cast	12.75 to 13.00
Bundled sheet scrap,* f.o.b. consumers' mill, Pittsburgh district	11.50 to 12.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.75 to 14.00
No. 1 railroad malleable stock	12.50 to 12.75
Grate bars	10.75 to 11.00
Low phosphorus melting stock	16.00 to 16.25
Iron car axles	23.00 to 23.50
Steel car axles	17.50 to 18.00
Locomotive axles	23.00
No. 1 busheling scrap	12.00 to 12 25
No. 2 busheling scrap	8.50 to 8.75
Old car wheels	13.50 to 13.75
Sheet bar crop ends	15.50 to 15.75
Cast iron borings	9.00 to 9.25
*Machine shop turnings	9.25 to 9.50
Old iron rails	15.00 to 15.25
No. 1 wrought scrap	13.50 to 14.00
Heavy steel axle turnings	10.00 to 10.25
Stove plate	10.50 to 10.75

* These prices are f.o.b. cars at consumers' mill in the Pittsburgh district.

Coke.—The market for prompt furnace coke has stiffened. Very little coke loaded on cars has been offered, and to-day there does not appear to be a car loaded and unsold. Several dealers have been bidding freely for coke required to fill their contracts and this absorption has cleaned up the market until the minimum is $1.50 at oven for prompt furnace coke of regular quality. Contract coke has not been under serious negotiation, as furnaces now running are fairly well covered or have decided not to contract but to buy from month to month. Foundry coke is in limited demand, as the foundries are rather slack of work and they are generally well covered by their contracts. We quote standard grades, per net ton at oven, as follows: Prompt furnace, $1.50 to $1.55; contracts over last five months, $1.65 to $1.75; 72-hr. foundry coke for prompt shipment, $1.85 to $2; contract, $2 to $2.25. The output of coke last week in the Connellsville and lower Connellsville region was 270,700 tons, an increase of 3600 tons, and shipments were 8260 cars, an increase of 600 cars.

Chicago

CHICAGO, ILL., July 26, 1911.—*(By Telegraph.)*

The market is looking forward with a pronounced hopefulness for the developments of the month of August. The larger business expected has already given rise to a firmer attitude, which is more particularly noticeable with respect to pig iron. While South-

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ern iron may still be bought in this market on the basis of $10, Birmingham, this price is not so general. In finished steel lines the tonnage booked locally was not so large as in the week preceding, but was of a character to support belief in the steady growth of consumption requirements. Rail sales reported were less than 5000 tons while the building and structural steel contracts amounted to about 7500 tons. The week's average was largely upheld by specifications against plate and structural contracts, which were reported to be more than satisfactory. The fact that attractive steel bar business is still bringing out concessions from the price of 1.25c., Pittsburgh, seems impossible of further disguising and reveals the probability that this price has been for the most part nominal. Buying from jobbers' stocks, except in very small quantities, is light. Consumers may accurately gauge the general situation from the fact that mill shipments continue quite prompt and that jobbers are buying very lightly for their own stocks.

Pig Iron.—The melt of both malleable and gray iron foundries shows evidences of some increase. The former have begun to close their agricultural implement contracts for the year and now have in sight some tangible business against which to apply their recent purchases. A fair tonnage of both local and Southern iron was bought the past week and the impression prevails that the average buyer has covered for at least a limited period. Southern No. 2 iron was sold last week on the basis of $10, Birmingham, but an inclination to hedge on this price is beginning to be displayed by some of the furnaces. With enough iron sold to take care of customers for the next 30 to 60 days, and with all indications pointing to stronger conditions, this firmer attitude appears to be a natural one. For local iron little encouragement is offered for improvement in prices. Buyers report that iron has been and can still be obtained on the basis of $14.50 at local furnace for No. 2. Such a price would not appear to be out of line with the situation. Chicago territory furnaces still have a stock of iron and there are but four stacks in blast out of eleven. We quote for Chicago delivery, except on local irons, which are f.o.b. furnace, the following prices:

Lake Superior charcoal	$16.50 to $17.00
Northern coke foundry, No. 1	15.00 to 15.50
Northern coke foundry, No. 2	14.50 to 15.00
Northern coke foundry, No. 3	14.25 to 14.50
Northern Scotch, No. 1	16.00
Southern coke, No. 1 foundry and No. 1 soft	14.85 to 15.10
Southern coke, No. 2 foundry and No. 2 soft	14.35 to 14.60
Southern coke, No. 3	14.10 to 14.35
Southern coke, No. 4	13.85 to 14.10
Southern gray forge	13.60 to 13.85
Southern mottled	13.60 to 13.85
Malleable Bessemer	15.00
Standard Bessemer	17.40
Basic	15.50
Jackson Co. and Kentucky silvery, 6 per cent	17.90
Jackson Co. and Kentucky silvery, 8 per cent	18.90
Jackson Co. and Kentucky silvery, 10 per cent	19.90

(By Mail.)

Rail and Track Supplies.—The tonnage of rails placed here during the last week was less than 5000, indicating that all of the immediately pending rail business was included in the orders of the preceding week. It is reported that prices on track fastenings are being maintained only with some effort and that in territory where rerolling rails enter into competition the price on light rails has yielded materially under pressure. For Chicago we continue to quote standard railroad spikes at 1.65c. to 1.75c., base; track bolts with square nuts, 2.10c. to 2.20c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c. to 1.60c., Chicago.

Structural Material.—The tonnage of structural steel closed in the week was less by 2400 tons than was anticipated because of the substitution of reinforced concrete. Buildings for the St. Paul Bread Company at St. Paul and for the Fitger Brewing Company at Duluth will be of this construction. The most important letting of the week was 3720 tons of steel for transmission towers for the Nevada-California Power Company to be furnished by Milliken Bros. The American Bridge Company was awarded the contracts for 300 tons for the State Museum at Denver and for the Asylum buildings at Medical Lake, Wash. Despite the very large tonnage of steel now being fabricated for local buildings Chicago fabricators are none too busy and prices reflect this situation. Mill rolling of shapes continues active with pleasing tonnages booked ahead. We quote plain material from mill at 1.53c. to 1.58c. and from store 1.75c., Chicago.

Plates.—Specifications against bridge material contracts are bringing a satisfactory tonnage of plates to the local mills, to which is added an increasing volume of car and tank plates. This provides tonnage for both universal and sheared plate mills. Mill deliveries are quite prompt and consumers are ordering for mill shipment rather than from store. The light trade and the fact that present prices do not indicate any necessity for stocking up have reduced buying by the jobbers to a minimum. Chicago quotations for mill shipment are 1.53c. to 1.58c. and from store 1.75c.

Sheets.—The demand for sheets at present is characterized by an insistent call for exceedingly prompt shipment. The explanation is found in the very low stocks in the hands of both jobbers and manufacturers. The increasing volume of business finds them loath to cover themselves more liberally, preferring to depend upon prompt shipments. While the local mills are running in all departments in the enjoyment of gradually increasing tonnage prices apparently do not gain in strength correspondingly. We continue to quote Chicago prices as follows: Carload lots, from mill: No. 28 black sheets, 2.18c.; No. 28 galvanized, 3.18c.; No. 10 blue annealed, 1.68c. Prices from store, Chicago, are: No. 10, 1.95c. to 2.05c.; No. 12, 2.00cc. to 2.10c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.45c to 3.55c.

Old Material.—The local market is almost always characterized by more or less speculative buying of railroad scrap where the buyer hopes for a rise between the date of purchase and the delivery of the material. The fact that the volume of this kind of buying is materially decreased would indicate that little hope is held for higher price levels within the next five or six weeks. The current railroad offerings include 1200 tons by the Chicago, Milwaukee & St. Paul, 3800 tons by the Chicago, Burlington & Quincy and about 3000 tons by the Chicago, Rock Island & Pacific. There is practically no change in prices, with the exception of locomotive tires, for which an Indiana consumer is offering in the neighborhood of $15, Chicago. We quote below for delivery to buyers' works, Chicago vicinity, all freight and transfer charges paid, per gross ton, as follows:

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	12.25 to 12.50
Old steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard sections, subject to inspection	24.00
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Steel axle turnings	8.50 to 9.00

The following quotations are per net ton:

Iron angles and splice bars	$12.50 to $13.00
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.25 to 10.75
Iron car axles	18.00 to 18.50
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	11.00 to 11.25
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	9.25 to 9.75
Locomotive tires, smooth	15.00 to 15.50
Machine shop turnings	6.25 to 6.75
Cast and mixed borings	5.25 to 5.75
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.75 to 7.25
No. 1 boilers, cut to sheets and rings	7.50 to 8.00
Boiler punchings	12.00 to 12.50
No. 1 cast scrap	10.25 to 10.75
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.25 to 9.75
Pipes and flues	8.00 to 8.50

Bars.—Steel bar contracts on the books of the leading manufacturers are reported as very satisfactory, but specifications drag somewhat. It is intimated that comparatively little of the business obtained from the larger buyers was placed at the 1.25c. price because at this time such attractive business as is still being placed brings out concessions from this basis. The extent to which the nominal price has been shaded may be conjectured accordingly. Bar iron continues to be quoted in the neighborhood of 1.20c., with only a moderate tonnage offered. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.43c.; bar iron, 1.20c. to 1.25c.; hard steel bars, rolled from old rails, 1.20c. to 1.25c. From store, soft steel bars, 1.70c. to 1.80c., Chicago.

Wire Products.—Local consumption of wire nails, retarded in the early summer by the delaying of building operations as a result of labor troubles, is now showing improvement. The more favorable crop reports that are now expected will, it is hoped, encourage the demand for barb wire. Woven wire fencing reflects

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a growing interest on the part of manufacturers and for the summer season plain wire is fairly active. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.68c.; wire nails, 1.88c.; painted barb wire, 1.88c.; galvanized, 2.18c.; polished staples, 1.88c.; galvanized, 2.18c., all Chicago.

Cast Iron Pipe.—The principal letting of pipe reported for the past week was 4000 tons for the city of Flint, Mich., to be furnished by the Lynchburg Foundry Company, Lynchburg, W. Va. Minneapolis will award this week a contract for 3000 tons of 60-in. pipe. Scattering business in small lots continues good. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $24.50; 16 in. and up, $24, with $1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., July 25, 1911.

While no pronounced activity exists in the demand for either crude or finished materials, the volume of current business appears to be equal to that taken the previous week. A fair amount of buying continues in the pig iron market, with consumers showing a greater interest in requirements for extended delivery. The position of producers is gradually improving. In some lines of finished products a little irregularity in new business is reported, but the tone of the market remains good and the trade anticipates a gradual improvement in buying, although marked activity is hardly expected until later in the year. Orders for steel billets have not been so large, although inquiries are more numerous. More contracting in heavy steel plates for delivery over the remainder of the year is noted. Current demand for plain structural shapes has been quieter. A tendency to stiffen up prices for iron bars is evident, due to higher prices of old material. Coke has been but moderately active. Old material prices are in some instances a trifle higher, due to increasing inquiry.

Iron Ore.—There is an absence of any business of importance, either in domestic or foreign ore. Importations at this port in the week ending July 22 included 10,800 tons of Cuban, 12,630 tons of Newfoundland, 10,539 tons of Swedish and 11,119 tons of Spanish ore.

Pig Iron.—Consumers show more interest in the pig iron market, particularly in the foundry grades. While the greater part of the demand is still confined to lots ranging up to 500 tons, for both near future and extended delivery, inquiry for occasional larger amounts is reported, together with some quiet testing of the market for round lots. Sellers are decidedly more optimistic in their views and, while no direct advances in prices are to be noted, some sales have been made at the top of the market for foundry grades for delivery over the last half. The reported stiffening of prices in other districts has strengthened the market here. While individual sales of foundry grades have not been particularly large, the aggregate business is evidently greater. Transactions in eastern Pennsylvania No. 2 X foundry in lots of several hundred tons, for both third quarter and remainder of the year delivery, are reported at both $15 and $15.25, delivered. Moderate sales of No. 2 plain have been made at $14.75 and $15, and a sale of No. 3 foundry is reported at $14.75, delivered. The Delaware, Lackawanna & Western Railroad has closed for 1000 tons of No. 2 X against its recent inquiry, the order going to a Lehigh Valley producer. Some demand for low grade foundry iron continues; one Delaware River concern has not yet closed, it is said, for a round lot recently inquired for. A better movement in Virginia foundry iron is reported. Sales of 1000-ton lots of No. 2 X foundry for New England delivery, shipment extending over five months, have been made at $12.50, Virginia furnace. Quite a few sales in lots of several hundred tons at $12.25 for the remainder of the third quarter and $12.50 for more extended delivery are also reported. Another transaction is the sale of 1500 tons of pipe-making iron for local consumption, for three months' delivery, at a good price. The leading interest as well as several other Virginia producers is maintaining recent prices, although iron of less favorable analysis is to be had at slight concessions, and, it is said, off grades have been offered, to clean up stocks, at a sharp reduction. Such transactions have had no material effect on the general market. Forge iron, which has been very quiet recently, shows more movement. Sales of moderate lots of Northern forge have been made to rolling mills at $14.50, delivered. Small sales of Southern forge are also reported at $9, Birmingham, and in some cases this price has been slightly advanced, $9.50 being asked by some of the Southern producers. Little movement has developed in the steel making grades. Reports of an additional purchase of 5000 tons of this iron by a central Pennsylvania consumer lack confirmation at this time. Eastern producers are standing pretty firmly on $14, furnace, for this grade, which would represent a minimum of $14.50 delivered. Moderate sales of low phosphorus iron are reported, with standard analysis brands at $20.50 minimum, although iron of analysis close to standard is available at $20, delivered. The following range of prices is named for standard brands, delivered in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$15.00 to $15.25
Eastern Pennsylvania No. 2 plain	14.75 to 15.00
Virginia foundry	15.00 to 15.50
Gray forge	14.50
Basic	14.50 to 15.00
Standard low phosphorus	20.50 to 20.75

Ferromanganese.—There is still an absence of demand from consumers in this territory. Sellers report a disposition on the part of foreign producers to advance the price of 80 per cent. Ferro to a basis of $37, Baltimore, although there is little doubt that $36.50, Baltimore, could still be done should any desirable business be offered.

Billets.—While the general run of orders is again confined to small lots, considerable inquiry continues and consumers are negotiating for lots of 2000 to 3000 tons of rolling billets for forward delivery. The demand for forging steel has been quieter. Mills are running on an even basis and are encouraged with the outlook for future business. Prices are unchanged, rolling billets being quoted at $23.40, and ordinary forging billets at $28.40, delivered in this vicinity.

Plates.—Current orders covering the usual miscellaneous run of business show a trifle irregular tendency, although specifications are reported as coming out freely and mill operations continue on an unchanged basis. A greater volume of forward business is reported, contracts having been closed by mills in this district for round lots, in some cases 3000 to 4000 tons and upwards, at present prices, for deliveries running over the remainder of the year. Sales for earlier delivery usually run from small lots to upward of 500 tons. Considerable inquiry for ship material is to be noted. One builder is in the market for about 3000 tons of plates and shapes for government colliers, while another is asking prices for 700 tons of plates for government tugs. Quite a few quotations have been made against prospective requirements of builders, who are figuring on quite a large amount of general shipbuilding work. Prices for ordinary plates appear to be fully maintained at 1.50c., delivered in this territory. Rumors of weakness have been heard, but lack confirmation.

Structural Material.—A somewhat smaller volume of general business has been coming to the mills, although producers of plain shapes maintain their recent basis of output. Negotiations under way close slowly. Several new propositions are in sight in this city, including the new Stock Exchange building and the municipal convention hall, the steel requirements of which are not yet decided. Contracts for small bridges for the Pennsylvania and the Reading railroads are being figured. Inquiries are also before the trade for a fair amount of shapes for boat work. Prices of fabricated material are still low, although those for plain shapes are maintained at 1.50c., delivered here.

Sheets.—Eastern mills continue to report a good demand and are operating at full capacity. For the most part orders are small and for reasonably early delivery. More business in Western sheets is reported, with prices irregular. Makers in this district, however, hold recent quotations firmly, the following range, f.o.b. Eastern maker's mill, being named: Nos. 18 to 20, 2.30c.; Nos. 22 to 24, 2.40c.; Nos. 25 to 26, 2.50c.; No. 27, 2.60c.; No. 28, 2.80c.

Bars.—Little change in the demand is seen. Current orders are usually small. Some producers who, on extra desirable specifications, have been quietly shading 1.20c., mill, the general quotation for ordinary refined iron bars, have withdrawn lower quotations and are firm at the basis named, and owing to higher prices of old material are inclined to make a slight advance. At the present basis refined iron bars, delivered here, are quoted at 1.27½c. to 1.32½c. Rumors are still afloat that steel bars are to be had at 1.20c., Pittsburgh, al-

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though the leading sellers in this territory contend that they have not shaded the recent 1.25c., base, or 1.40c. delivered here.

Coke.—A number of large consumers of furnace coke who have recently been in the market for supplies ranging over six months and a year, have not yet closed for their requirements, taking in the meantime spot coke which has been available at $1.40 to $1.50, at oven. Some moderate contracts for foundry coke for delivery over the remainder of the year are reported, sales in some instances covering lots of 1000 tons, at prices ranging from $2 to $2.35, at oven. The following range of quotations per net ton is named for delivery in this district:

Connellsville furnace coke	$3.65 to $3.90
Foundry coke	4.15 to 4.60
Mountain furnace coke	3.25 to 3.50
Foundry coke	3.75 to 4.20

Old Material.—Consumers show more interest in the market and offers at slightly higher prices than recently quoted for some grades of material have, in the majority of cases, failed to bring out any quantity of material, sellers being disposed to hold for higher prices. In some cases offers of $13.50, delivered, for strictly No. 1 heavy melting steel scrap have failed to result in any heavy sales, it is said. Yard steel is, however, available at $13 to $13.25, delivered. Wrought iron scrap is in better demand and sales have been made at an advance of 50c. a ton. Wrought iron pipe, wrought turnings and cast borings also show a slight advance. Increasing interest is expected to result in higher prices in practically all grades, and holders of material are less disposed to make sales than they were a few weeks ago. The following range of prices about represents the market for early deliveries in buyers' yards, eastern Pennsylvania and nearby points, carying a freight rate from Philadelphia, varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel scrap	$13.50 to $13.75
Old steel rails, rerolling (nominal)	14.25 to 14.75
Low phosphorus heavy melting steel scrap	16.75 to 17.25
Old steel axles (nominal)	19.50 to 20.00
Old iron axles	24.50 to 25.00
Old iron rails	17.50 to 18.00
Old car wheels	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Wrought iron pipe	13.00 to 13.50
No. 1 forge fire	11.00 to 11.50
No. 2 light iron (nominal)	6.75 to 7.25
Wrought turnings	9.50 to 10.00
Cast borings	9.00 to 9.50
Machinery cast	13.25 to 13.75
Railroad malleable (nominal)	11.50 to 12.00
Grate bars, railroad	10.00 to 10.50
Stove plate	10.50 to 11.00

Cleveland

CLEVELAND, OHIO, July 25, 1911.

Iron Ore.—Following a little activity noted last week, the market is again very dull. No sales or inquiries are reported. Selling firms regard the outlook as more encouraging because of the improved demand for pig iron. They expect that orders for quite a fair tonnage of ore will be placed before the close of the season and that buyers will not delay beyond the latter part of August or early in September coming into the market for their requirements. We quote prices as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Coke.—There is no inquiry for furnace grades and the demand for foundry coke is very light. Foundries that have not already covered do not appear to be interested in contracts for their last half requirements. We quote standard Connellsville furnace coke at $1.40 to $1.50 per net ton at oven for spot shipment and $1.65 to $1.75 for the remainder of the year. Connellsville 72-hour foundry coke is held at $1.80 to $2.15 for prompt shipment and $2.15 to $2.40 for the last half.

Pig Iron.—The market shows an improvement both in the volume of sales and inquiries. Some round lots have been booked for shipment outside of this territory and there is a fair demand for foundry grades from this immediate locality. The leading pipe interest is understood to have practically closed contracts for a round tonnage of Southern iron for shipment to its various plants. We note the sale of 1000 tons of No. 4 Southern to a local pipe plant. The same concern has been feeling the market for about 3000 tons of Northern iron, but may not buy for the present. A local foundry has just bought 1000 tons of Northern iron for the last half. A number of other sales of Northern iron in lots of 500 tons and under are reported. We note the sale of 2500 tons of No. 2 Southern iron to a leading sanitary interest for shipment to its Louisville plant during the last half. A Cleveland furnace builder is in the market for about 1500 tons of Southern iron for the same delivery. One local interest has sold its available tonnage and is out of the market. Prices on Northern grades are unchanged at $13.50, Cleveland and Valley furnace, for No. 2. The Southern market is firmer in that less iron is being offered at $10, Birmingham, for No. 2. For prompt shipment and for the last half we quote, delivered Cleveland, as follows:

Bessemer	$15.90
Basic	$13.75 to 14.00
Northern foundry, No. 2	13.75 to 14.00
Gray forge	13.25
Southern foundry, No. 2	14.35 to 14.60
Jackson Co. silvery, 8 per cent. silicon	17.50 to 17.75

Finished Iron and Steel.—The general condition of the trade in finished lines is fairly satisfactory. While no large orders or inquiries are coming out, mills are getting a good volume of small orders and specifications on contract. The demand for structural material is more active at present than other lines. Fabricators are getting a good volume of small work and are ordering material freely to replenish stocks. The steel bar market appears to be somewhat firmer. Regular prices seem to be maintained on contracts, but for desirable orders for prompt shipment a concession of $1 a ton can still be secured. While the leading producers are adhering to the regular prices on plates, some of the mills making the narrow sizes are shading prices $1 a ton. The demand for sheets is fairly good but the market is not firm. Concessions of $1 to $2 a ton are reported on heavy sheets. Local bolt and nut makers report an improvement in the demand for their products but prices are still low. No new contracts for round lots of structural material for buildings are reported, although bids are in on some work. The City Hall Commission has decided to reject all bids for the 4500 tons of steel required for the new city hall in Cleveland and to readvertise after making some modification in the specifications. This will delay the letting of the contract about 30 days. The foundations for the grade-crossing elimination work for the Pennsylvania Railroad in Cleveland, for which bids have been received, will require considerable tonnage of twisted steel bars for concrete reinforcement. A large quantity of structural steel will be required for the bridges but this will probably not come out for some time. The demand for iron bars continues light and neither of the local mills may start up until after August 1. We quote iron bars at 1.25c. to 1.30c., at mill.

Old Material.—The market has a firmer tone and prices on several grades have advanced from 25c. to 50c. a ton. There is a somewhat better volume of inquiry but it is largely between dealers. One local consumer has bought considerable steel-making scrap during the week in small lots and is in the market for additional tonnage. Yard dealers are very firm on prices and those that can are holding their stocks for a further advance. The Nickel Plate Railroad closed July 22 on a small tonnage. Dealers' prices, per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails, rerolling	$13.00 to $13.50
Old iron rails	15.00 to 15.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.75 to 12.25
Old car wheels	12.00 to 12.25
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.75 to 11.25
Railroad malleable	12.25 to 12.75
Light bundled sheet scrap	10.00 to 10.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	6.75 to 7.00
Iron and steel turnings and drillings	7.00 to 7.50
Steel axle turnings	8.00 to 8.50
No. 1 busheling	11.00 to 11.50
No. 1 railroad wrought	11.75 to 12.25
No. 1 cast	11.25 to 11.75
Stove plate	9.50 to 10.00
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, July 26, 1911.—*(By Telegraph.)*

Pig Iron.—The situation shows a trifle more strength. It is rumored that a leading pipe manufacturer is about to contract for a large tonnage of iron and there are a number of inquiries from Indiana and Michigan. Several Southern furnaces that have been eager to take on fourth quarter business at $10 are

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now insisting on contracts calling for shipments to begin immediately. As the majority of the furnaces in the Hanging Rock district are out, there is a steady reduction in stocks there although the melt in this vicinity shows no material increase. From northern Michigan is an inquiry for 500 to 1000 tons of Northern No. 2 foundry and a Michigan stove manufacturer is asking for a round lot of either Northern or Southern iron. Several Indiana consumers are reaching out for a future supply, and there are a few small inquiries from nearby consumers. For delivery throughout the remainder of the year, and at present market prices, one Michigan firm took 1500 tons of Jackson County silvery, 2500 tons of Northern No. 2 foundry and 1500 tons of Southern No. 2 foundry. A Western railroad purchased 1000 tons of Southern charcoal iron around $22.50 at furnace for last half shipment. For July-December shipment 400 tons of Southern No. 1 soft goes to a central Ohio manufacturer and 1000 tons of Southern No. 4 to a northern Ohio consumer. Malleable is quoted at $13.25, Ironton, and an Indiana melter took 1000 tons, shipments to run until January next. There is no demand for Southern basic, and $10, Birmingham, is the quoted price for movement this year. Both Northern and Southern furnaces are refraining from putting out any quotations on next year's business and are turning down offers for that delivery. Based on freight rates at $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$13.75 to $14.00
Southern coke, No. 2 foundry and 2 soft	13.25 to 13.50
Southern coke, No. 3 foundry	12.75 to 13.00
Southern coke, No. 4 foundry	12.50 to 12.75
Southern gray forge	12.50 to 12.75
Ohio silvery, 8 per cent. silicon	16.95 to 17.20
Lake Superior coke, No. 1	14.70 to 14.95
Lake Superior coke, No. 2	14.20 to 14.45
Lake Superior coke, No. 3	13.70 to 13.95
Basic, Northern	14.45 to 14.70
Standard Southern car wheel	25.25 to 25.75
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Specifications on foundry contracts previously made are coming in quite freely and in some instances there are urgent requests for 72-hr. coke to fill immediate requirements. This is not due to any increase in the consumption, but is attributable to a recently acquired habit of procrastination on the part of the foundries in making known their future wants. No activity is reported in furnace coke and inquiries for both furnace and foundry grades are very scarce. The output in all three fields has been reduced to meet present conditions and prices are unchanged. We quote prompt shipment 48-hr. coke from $1.40 to $1.55 per net ton at oven, with the usual premium of about 15c. per ton asked on contracts. Foundry coke is obtainable around $2 for immediate shipment, with a future supply available at $2.10 to $2.35. These quotations govern in the Connellsville, Wise County and Pocahontas districts.

Finished Material.—Some activity in structural material shapes is noted, but other lines are quiet. Steel bars are not in much demand, though mill prices are firm. Tin plates in this territory are sagging, and it is rumored that the regular market prices have been slightly reduced where business was in sight. Wire nails are also somewhat disappointing; while it is stated that quotations are being shaded a trifle by some manufacturers, this cannot be definitely confirmed here. The local warehouse price on steel bars is 1.70c. and on structural material 1.80c.

Old Material.—The previously reported limited demand for scrap material of all kinds continues to prevail. However, it is quite probable that a few grades will show some activity when the rolling mills in this vicinity resume operations. Railroad offerings are light and both buyers and sellers appear to be waiting on the pig iron market. Prices for delivery in buyers' yards, southern Ohio and Cincinnati, are as follows:

No. 1 railroad wrought, net ton	$10.50 to $11.00
Casting borings, net ton	4.50 to 5.00
Steel turnings, net ton	5.50 to 6.00
No. 1 cast scrap, net ton	9.50 to 10.00
Burnt scrap, net ton	6.50 to 7.00
Old iron axles, net ton	16.50 to 17.00
Bundled sheet scrap, gross ton	7.25 to 8.25
Old iron rails, gross ton	13.50 to 14.00
Relaying rails, 50 lb. and up, gross ton	21.00 to 22.00
Old car wheels, gross ton	10.25 to 11.00
Heavy melting steel scrap, gross ton	10.00 to 10.50

Buffalo

BUFFALO, N. Y., July 25, 1911.

Pig Iron.—The majority of producers report a well sustained interest on the part of consumers with a good tonnage under negotiation for foundry grades and malleable and a fair amount of business placed. One or two interests, however, report a quieting down in inquiry for the week, with fewer sales. Foundries in most lines are apparently doing business in increasing volume. One furnace interest reports the booking of 50,000 tons so far during the month of July, including foundry grades and malleable, and that shipments from its furnaces have been far heavier than usual for the month of July. Its shipments for the week just closed were over 4000 tons in excess of the amount produced in the week. Prices are unchanged, with furnacemen holding firmly to the maintenance of the slight advance in schedules recently made effective. We quote as follows for prompt and last half shipment, f.o.b. Buffalo:

No. 1 X foundry	$13.75 to $14.25
No. 2 X foundry	13.50 to 14.00
No. 2 plain	13.25 to 13.75
No. 3 foundry	13.25 to 13.50
Gray forge	13.25 to 13.50
Malleable	13.75 to 14.25
Basic	13.75 to 14.25
Charcoal	16.50 to 17.25

Finished Iron and Steel.—The volume of business in finished products is holding up to a good aggregate for midsummer and quite a number of additional contracts in steel bars and bar products have been closed in the week, including one long-time contract of large tonnage for steel bars. A good business in concrete reinforcing bars has also been done in the week. Some small contracts for wire products have also been placed. Wire business for July has been unusually good for the season. The demand for plain structural material remains active. Prices in this territory are firm at 1.25c. for steel bars and small shapes and 1.35c. for shapes and plates. In fabricated shapes the demand continues active and a good many small lots are being called for. Bids are to be received August 1 for the steel for the Erie County Lodging House, Buffalo, about 100 tons. The Buffalo Structural Steel Company was low bidder for the fabrication and erection of the steel for the St. George School, Buffalo, requiring about the same tonnage. The Eastern Concrete Steel Company, Buffalo, has received the contract for the three new buildings to be erected by Cornell University, Ithaca, taking about 500 tons of structural steel. The Lackawanna Steel Company this week received an order from the Canadian Pacific Railway for 3000 tons of steel rails.

Old Material.—The market continues strong, with a fairly active demand for all classes of material. Consumers are showing more interest in the taking on of supplies and are apparently more disposed to pay the advanced prices asked by dealers and are purchasing more freely. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$13.00 to $13.50
Low phosphorus steel	15.50 to 16.00
No. 1 railroad wrought	14.00 to 14.50
No. 1 railroad and machinery cast scrap	13.75 to 14.25
Old steel axles	18.50 to 19.00
Old iron axles	22.00 to 22.50
Old car wheels	13.00 to 13.50
Railroad malleable	12.50 to 13.00
Boiler plate	12.00 to 12.50
Locomotive grate bars	11.00 to 11.50
Pipe	9.50 to 9.75
Wrought iron and soft steel turnings	7.00 to 7.50
Clean cast borings	6.75 to 7.25

Birmingham

BIRMINGHAM, ALA., July 22, 1911.

Pig Iron.—The reported sale of 25,000 tons of local iron to a manufacturer of cast-iron pipe cannot be confirmed at this time, but such a sale is generally believed to have been effected during the week. Of other tonnage known to have been sold the largest single lot reported was 1500 tons of Nos. 2 and 3 foundry for shipment in the third quarter. This sale is reported at a basis of $10.50, Birmingham, as is also an aggregate of 3500 tons in lots of 500 to 750 tons each for shipment covering the remainder of the year. A lot of 1000 tons of No. 2 soft for shipment commencing immediately and extending over the remainder of the year was sold at $10, Birmingham. A lot of 500 tons of No. 3 foundry for third quarter shipment sold at $9.75, and a lot of 100 tons of No. 2 foundry for spot shipment brought $10.50, Birmingham. For comparatively small lots of No. 1 soft and silvery, which are being offered only for spot shipment, a $10.50 basis with the usual differentials has been paid readily. The same price has also been received for small lots of gray forge as is quoted for No. 4 foundry, when the last named was offered at a differential of

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25 cents per ton from the price for No. 3 foundry. There has been some demand for high manganese iron with a corresponding high silicon, and for small lots of that grade $11.50 to $12, Birmingham, has been paid. For low silicon iron with high manganese $10.75 to $11.50 is quotable. The most important development during the week was the adoption of prohibitive prices for all grades and for any delivery by one of the leading producers. As a result of the action just mentioned, it is believed that the available tonnage for delivery over the remainder of this year is left in the hands of two concerns. A third concern would probably not refuse prompt shipment at the $10 schedule, but it is reasonably certain that such a figure can no longer be had from four of the producing interests. The continued heavy movement from furnace yards has been very effective in strengthening the tone of the market. While it has been intimated that certain additional furnaces will be put in blast as a result of the increased demand, the prospects for a still closer adjustment of the output to the actual movement is the most encouraging feature at this time. There is as yet no established quotation for deliveries after January 10. The inquiry for spot and nearby deliveries pending at this time is very attractive comparatively. We quote the market as below for prompt shipment or deliveries covering the remainder of the year, per gross ton, at Birmingham furnaces:

No. 1 foundry and No. 1 soft	$10.50 to $11.00
No. 2 foundry and No. 2 soft	10.00 to 10.50
No. 3 foundry	9.50 to 10.00
No. 4 foundry	9.25 to 9.75
Gray forge	9.25 to 9.75
Mottled	9.00 to 9.50
Standard basic	10.00 to 10.50
Off basic	9.75 to 10.25
Charcoal car wheel iron	.... 22.50

Cast Iron Pipe.—No report is made of any large lettings coming to this market the past week, but a fairly satisfactory volume of small orders was placed. The schedule of prices has not been changed, but owing to the improved condition of the pig iron market and the tonnage now on order books of pipe manufacturers it is quite likely that less shading is being done. We quote the market for water pipe as follows, per net ton, f.o.b. here, which prices are firmer than at the time of last report: 4 to 6-in., $22; 8 to 12-in., $21; over 12-in., average, $20, with $1 per ton extra for gas pipe.

Old Material.—The condition of this market has improved but little. The local mills that are in operation are taking a fairly attractive tonnage of steel grades, but the continued suspension at the Alabama City mill is felt very keenly. Dealers' asking prices are all nominal, and we continue to quote as follows per gross ton f.o.b. cars here:

Old iron axles (light)	$13.50 to $14.00
Old steel axles (light)	12.50 to 13.50
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	9.50 to 10.00
No. 1 country wrought	7.50 to 8.00
No. 2 country wrought	7.00 to 7.50
No. 1 machinery	9.50 to 10.50
No. 1 steel	8.50 to 9.00
Tram car wheels	8.00 to 8.50
Standard car wheels	9.50 to 10.50
Light cast and stove plate	7.00 to 7.50

Coal and Coke.—Current quotations on standard Alabama 72-hour coke are apparently firm and the prices for steam coal have not suffered further decline. No transactions of particular interest were noted in this market in the past week, practically all contracts for the next twelve months having been entered. We quote 72-hour foundry coke at $3.25 to $3.50 per ton at Alabama ovens, and the best grades of run-of-mine steam coal at $1.35 to $1.50 per ton at mines.

The German Iron Market

BERLIN, July 13, 1911.—The situation in the iron trade appears to be as much involved in uncertainty as ever. The reported advance in prices for bars seems to be confined to export orders. According to a Dortmund dispatch leading manufacturers in the vicinity deny that there has been a firmer tendency for bars. That the general price situation continues weak is evident from two facts—the first that the price of band iron was reduced 2.50 marks to 125 marks several days ago, and the second that even heavy plates, which represent the best employed section of the trade, are rather inclined to weakness. According to the same Dortmund dispatch prices of heavy plates have dropped two marks below the minimum agreed upon by the convention, and the wire trade is in a most demoralized state and wire nails have dropped to 135 marks as against the convention price of 165 marks. The rivet association met this week, decided to make no change in prices for the present, and postponed the opening of business for the fourth quarter.

Weak prices but plenty of work to do seems to constitute the characteristic news from nearly all sections of the trade. In some lines orders have undoubtedly been increased in the past few weeks. The bar mills are in nearly all cases well supplied with orders, and most of them are asking about eight weeks to fill new orders. Heavy rails continue to be ordered in good amounts for export, and this is also true of grooved rails and rails for mines, but there is still an appreciable lack of work in nearly all forms of rails. In billets and blooms export business had dropped off somewhat in connection with the coronation festivities in England, but it has since then improved. It is added that American competition has hardly been felt. Nevertheless prices are rather weak. Billets f.o.b. seaport are quoted at 80 to 81 marks, and muck bars 85 to 86 marks. Beams and other structural shapes continue in good demand and conditions in the building trade seem to promise still further improvement. The export movement is increasing steadily.

June Shipments and Production.

The June shipments of the Steel Works Union in rails, structural shapes and billets amounted to 499,288 tons, being about 33,000 tons less than for May, but nearly 51,000 tons more than for June, 1910. The movement in both rails and structural shapes was exceeded this year only in March and May.

Pig iron production in June amounted to 1,262,997 metric tons. This was about 45,000 tons less than for May, but about 44,000 more than for June, 1910. Production for the first half year amounted to 7,682,639 tons, which was 480,600 tons more than last year and 1,430,000 tons more than for the like half of 1909. This year production will probably reach 15,000,000 tons.

The situation in the pig iron trade is scarcely changed. The same quiet, waiting tendency prevails. The market is still watching and waiting for the outcome of the negotiations for renewing the syndicate. The "ultimatum" against the Gutehoffnungs-Hütte was extended, and the report is that it is willing to abandon its claim for a big increase in its allotments if certain other concessions are made to it. The nature of these has not been stated, but they have been made the basis for a rather optimistic report on the outlook for the completion of the syndicate. The Siegen group of furnaces has again extended to the end of the month the period of abstention from taking orders for next year delivery, pending the outcome of the syndicate negotiations. The furnaces of that region are apparently very anxious now that the organization be completed in its extended form. A report on the results of the unattached furnaces of that district shows that only two in a list of seven paid dividends in 1909, and these two only 3 per cent. each, whereas their average dividend in 1906 was above 10½ per cent. This plainly shows that furnaces there not operated in connection with steel plants are having a hard struggle for existence.

Conditions in the hardware trade remain fairly satisfactory. In general enough work is in hand, but low prices still cause complaints. The demand for builders' hardware remains very active, and the autumn trade is expected to be brisk. At Solingen the cutlery trade is doing a rather large business, but at low prices. A report on the state of business there says that foreign countries, "despite customs house trickery," continue to buy Solingen goods.

A review of the Belgian market mentions a slight improvement since the beginning of the month, especially in bars. Orders for these are arriving in larger amounts and prices have been lifted somewhat.

The deal for the amalgamation of three important iron companies in Luxemburg and Lorrain, namely the Burbacher Hütte, the Eicher Hütte and the Düdelinger Hochofen-Gesellschaft, has now been consummated, the Düdelinger concern taking over the other two by issuing its stock to their shareholders. It is a powerful combination.

New York

NEW YORK, July 26, 1911.

Pig Iron.—The week has been rather quiet in this immediate territory. The most important sale announced was one of 1500 tons of foundry iron to a

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railroad company, which was secured by Buffalo makers. On this transaction the advanced price recently noted was maintained. It is understood that some small sales of Virginia iron have been made at a concession of 25 cents, but it is not believed that this applies to standard brands, which are held at $12.25 at furnace. Inquiries are light, either from nearby consumers or from New England territory. Northern iron is quoted as follows, at tidewater: No. 1 foundry, $15.50 to $15.75; No. 2 X, $15 to $15.25; No. 2 plain, $14.50 to $15. Southern No. 1 foundry is quoted at $14.75 to $15.25, and No. 2, $14.25 to $14.75.

Finished Iron and Steel.—Business in structural lines is perhaps a little better, but it is manifested in a larger aggregate of small orders. In plates conditions have not bettered, and it is doubtful if mills are running as high as 60 per cent. In bar iron one large producer reports betterment with even a stiffening in price. The only information obtainable on steel bars was not especially encouraging. Some of the late projects requiring structural material are an apartment house in New York for the Cambridge Construction Company, involving 600 tons; building for the Manhattan Soap Company, 900 tons; 300 tons for transfer bridges, Erie Railroad, and a building for the New York Telephone Company on Thirty-seventh street, for 900 or 1000 tons, although this has probably been given to Eidlitz & Ross. Some of the week's awards are: Weil building, Greenwich and Laight streets, 1000 tons, to Hay Foundry & Iron Works; Boston & Albany bridge, 240 tons, to the Fort Pitt Bridge Company; Pennsylvania Railroad, 120 tons, in bridges, to Pennsylvania Steel Company; Pennsylvania Railroad, 100-ton bridge to the Phoenix Bridge Company; First National Bank building, Richmond, Va., 2800 tons, to American Bridge Company; McElhatan bridge, Clinton county, Pa., 450 tons, to the Massillon Bridge Company; the 2000 tons in piersheds at Norfolk, Va., to the Virginia Bridge Company; 360-ton normal school, Washington, D. C., to Barber & Ross, Washington; 300-ton building, Coenties slip, to Mulcahy & Gibson; the 1000-ton Rochester, N. Y., railroad station to Gorsline & Swan, Rochester, general contractors; the 800-ton Golden loft, Lafavette and Howard streets, to Ravitch Brothers; the Beehive, Boston, 1300 tons, to Lauer & Harper, Baltimore, and 400 tons for mill building at Benson Mines, N. Y., to Eastern Steel Company. The New York subway contracts, involving 25,000 to 28,000 tons of steel work, as mentioned in this column two weeks ago, have been formally approved. Quotations are: Plain structural material and plates, 1.51c. to 1.56c.; steel bars, 1.36c. to 1.41c.; bar iron, 1.30c. to 1.35c., all New York. Plain material and plates from store, New York, 1.80c. to 1.90c.

Cast Iron Pipe.—The demand is light throughout the East. Carload lots of 6-in. are quoted at $21 to $22 per net ton, tidewater.

Old Material.—Dealers report a moderate demand for all classes of old material. Heavy melting steel scrap seems to be the subject of speculative buying among Philadelphia dealers. Inquiries have been received here for lots of 1000 to 5000 tons, but local brokers are averse to making sales of considerable quantities at present prices, fearing that they may not be able to cover such contracts, as holders are quite firm in their views. Borings and turnings are a little stronger. Inquiries have been received for some good quantities of cast scrap, but prices offered are below the current market. Relaying rails are in better demand and prices are a little higher. Quotations are as follows per gross ton, New York and vicinity:

Old girder and T rails for melting	$10.75 to $11.00
Heavy melting steel scrap	10.75 to 11.00
Relaying rails	20.50 to 21.50
Rerolling rails (nominal)	12.00 to 12.25
Standard hammered iron car axles	21.00 to 21.50
Old steel car axles	16.75 to 17.25
No. 1 railroad wrought	12.75 to 13.25
Wrought iron track scrap	11.75 to 12.25
No. 1 yard wrought, long	11.50 to 12.00
No. 1 yard wrought, short	11.00 to 11.50
Light iron	4.25 to 4.75
Cast borings	5.75 to 6.25
Wrought turnings	6.50 to 7.00
Wrought pipe	9.50 to 10.00
Old car wheels	11.00 to 11.50
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	8.50 to 9.00
Locomotive grate bars	8.50 to 9.00
Malleable cast	10.00 to 10.50

Ferroalloys.—Sellers of ferrosilicon in New York continue to refuse to take business at prices quoted elsewhere and they are asking $53 a ton for 50 per cent. Some fair sized sales of ferromanganese were made at around $36.50.

Metal Market

NEW YORK, July 26, 1911

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead.		Spelter.	
July.	Lake.	Electrolytic.	Tin. New York.	New York.	St. Louis.	New York.	St. Louis.
20	12.75	12.55	41.90	4.50	4.40	5.75	5.57½
21	12.75	12.55	42.10	4.50	4.40	5.75	5.57½
22	12.75	12.60	.....	4.50	4.42½	5.75	5.57½
24	12.75	12.60	41.65	4.50	4.45	5.75	5.57½
25	12.75	12.60	41.75	4.50	4.45	5.80	5.60
26	12.75	12.60	42.00	4.50	4.45	5.80	5.60

Tin is more plentiful than it has been in many weeks and is selling fairly well. Copper is quiet, but electrolytic is slightly stronger. Lead is firm and higher in St. Louis. Spelter has strengthened.

Copper.—There is hardly enough demand for copper to test the market but electrolytic has strengthened noticeably within the last two days and is now bringing five points more than it was a week ago. This is due to the fact that whatever demand has developed is for electrolytic. Some sales of Lake copper have been made but not much. The London market is slightly weaker than it was seven days ago, but on the whole the fluctuations have been very light and but little interest has been taken in the situation. This morning spot copper was sold in London at £56 3s. 9d. and futures for £56 15s. The exports of copper so far this month have not been large, amounting to about 24,841 tons.

Pig Tin.—If the cargoes of pig tin scheduled to arrive in this country before the month is out get in port on time, the July arrivals will amount to fully 5000 tons. So far this month 4616 tons have come into port and this is fully 1000 tons more than a normal month's arrivals. This, coupled with the fact that at a Banca sale in Holland to-day 2500 tons of tin were sold at £113, which is equal to 41.25c. c.i.f., New York, has encouraged consumers to believe that pig tin will go lower in the near future. The good supplies of spot tin now in this country have resulted in bringing the price down to the import parity and although the syndicate is reported to be taking hold again in London this market is not responding very noticeably to the upward movement there. A good steady business was done this week and considerable tin was sold for September delivery. This morning pig tin was offered at 42c. but prospective buyers were holding off in the expectation of a lower market here. In London to-day spot tin was offered at £191 5s. and futures at £187 5s.

Tin Plates.—Tin plates are fairly active, the demand coming chiefly from small consumers. The price continues at $3.94 for 100-lb. coke plates. The foreign market has been more quiet this week, although the price has remained at 13s. 9d.

Lead.—Some heavy sales of lead have been made but it is generally believed that the transactions were between dealers, as consumers are taking very little interest in the market, notwithstanding that the price has been steadily advancing. Outside sellers in St. Louis are now demanding 4.45c. but the leading interest continues to hold the market in New York at 4.50c. It is very apparent that some independent sellers of lead have disposed of all their spot holdings. Many of them sold right and left in this market a few weeks ago, while the leading interest held the umbrella by keeping the price at 4.50c. when its competitors were willing to take anywhere from five to ten points below that price. Now outside sellers are obliged to ask 4.60c. in New York and the consequence is that the American Smelting & Refining Company is commanding about all the business in sight.

Spelter.—Inquiries for spelter continue to come in in good volume and the market has strengthened somewhat in the last two days. Last Friday and Saturday sellers who quoted 5.57½c., St. Louis, failed to get some good business that was in sight and were notified by the consumers that they had placed their orders at a lower figure. Attempts to find out who was underselling the market were unsuccessful and as it has strengthened since it is believed that the sales were made by parties who are not regularly dealers. To-day the St. Louis price was from 5.60c. to 5.65c. and spot spelter could not be had in New York for less than 5.80c.

Antimony.—Antimony is stagnant and unchanged. Hallett's is 8c.; Cookson's, 8.50c.; Chinese, 7.25c., and Hungarian grades, 7.30c.

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Old Metals.—Quiet conditions prevail, with dealers' selling prices, New York, nominally unchanged, as follows:

Copper, heavy cut and crucible	12.00 to 12.25
Copper, heavy and wire	11.50 to 11.75
Copper, light and bottoms	10.75 to 11.00
Brass, heavy	8.00 to 8.25
Brass, light	6.75 to 7.00
Heavy machine composition	10.50 to 10.75
Composition turnings	8.75 to 9.00
Clean brass turnings	8.00 to 8.25
Lead, heavy	4.20 to 4.25
Lead, tea	3.95 to 4.00
Zinc, scrap	4.25 to 4.30

Chicago

JULY 25.—While the metal market has been fairly active prices have indicated some weakness. Lower quotations on tin obtained, and spelter was offered at some concessions. We quote, Chicago delivery, as follows: Casting copper, 12.65c.; lake, 13.00c., in carloads, for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 43c.; small lots, 45c.; lead, desilverized, 4.47½c. to 4.50c. for 50-ton lots; corroding, 4.72½c. to 4.75c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.65c. to 5.70c.; Cookson's antimony, 9¼c., and other grades, 8¼c. to 8¾c., in small lots; sheet zinc is $7.50 f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 10¾c.; copper bottoms, 9½c.; copper clips, 10¼c.; red brass, 9½c.; yellow brass, 7½c.; lead pipe, 3.90c.; zinc, 3.90c.; pewter, No. 1, 26c.; tin foil, 33c.; block tin pipe, 37c.

Iron and Industrial Stocks

NEW YORK, July 26, 1911.

Although exceedingly dull, the stock market was firm until Tuesday, when prices gave way somewhat as a result of the Interstate Commerce Commission's decision reducing freight rates on transcontinental business. Steel common touched the highest point of the year and National Enameling made a notable advance. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalmrs., com.	8½	Railway Spgs., com.	37 - 38
Beth. Steel, com.	32½ - 34⅜	Republic, com.	30 - 30¾
Beth. Steel, pref.	62 - 63⅜	Republic, pref.	93¾ - 95
Can, com.	11 - 11¾	Sloss, com.	49 - 50
Can, pref.	86½ - 88¾	Pipe, com.	16
Car & Fdry., com.	57 - 58¼	Pipe, pref.	51 - 55¾
Car & Fdry., pref.	118 - 118¼	U. S. Steel, com.	79 - 80½
Steel Foundries	39¾ - 40	U. S. Steel, pref.	118⅛ - 119¼
Colorado Fuel	34¼ - 36	Westinghouse Elec.	75 - 75⅞
General Electric	161 - 163½	Va. I. C. & C.	88¾ - 91
Gr. N. Ore Cert.	59¼ - 61⅝	Am. Ship, com.	59 - 64
Int. Harv., com.	123½ - 125⅜	Am. Ship, pref.	111
Int. Harv., pref.	124½ - 125¾	Chic. Pneu. Tool	51½ - 51¾
Int. Pump, com.	41¼ - 42¾	Cambria Steel	45½ - 47¼
Int. Pump, pref.	88¾ - 89¾	Lake Sup. Corp.	27 - 27⅜
Locomotive, com.	40¾ - 42¼	Pa. Steel, pref.	105½
Locomotive, pref.	108	Warwick	10
Nat. En. & St., com.	19¾ - 22	Crucible St., com.	13
Nat. En. & St., pref.	96¼ - 100¾	Crucible St., pref.	82¾ - 83
Pressed Steel, com.	37 - 37⅝	Harb. Wk. Ref., com.	53 - 54½
Pressed Steel, pref.	102 - 103	Harb. Wk. Ref., pref.	98

Negotiations have been practically completed for the sale of $9,753,000 Illinois Steel Company 4½ per cent. debenture gold bonds of 1940, held in the treasury of the United States Steel Corporation. The financing will be done by J. P. Morgan & Co. The proceeds will be used for capitalizing new construction completed, and the redemption of $6,900,000 Illinois Steel Company 5 per cent. nonconvertible debentures maturing April 1, 1913. The Illinois Steel Company has put back into the property millions of dollars from earnings, which have never been capitalized. For several years the Steel Corporation has been issuing subsidiary bonds in connection with new construction, but the bonds redeemed have largely offset these new issues. The net decrease in bonded, debenture and mortgage debt of the Steel Corporation in 1910 was $10,447,514.

The Crucible Coal Company, Pittsburgh, organized to develop recently acquired coal holdings of the Crucible Steel Company of America, has issued 5 per cent. 25-year fund bonds to the amount of $5,000,000.

Dividends Declared

The Russell Motor Car, Ltd., quarterly, 1¾ per cent. on common and preferred, payable August 1.

The National Enameling & Stamping Company, regular annual 7 per cent., on preferred, payable in four installments of 1¾ per cent. each—October 1, January 1, April 1 and July 1.

The Buckeye Steel Casting Company, quarterly, 1½ per cent. on common and preferred, payable August 1.

The National Lead Company, quarterly, 1¾ per cent on preferred, payable September 15, and ¾ per cent. on common, payable September 30.

The United Metal Products Company, quarterly, 1¾ per cent. on preferred, payable August 10.

The McCrum-Howell Company, quarterly, 1¾ per cent. on preferred, payable August 1.

The J. G. Brill Company, quarterly, 1¾ per cent. on preferred, payable August 1.

The Chicago Pneumatic Tool Company, quarterly, 1 per cent., payable July 26.

The Computing Scale Company, quarterly, 1½ per cent., payable August 2.

The Mianus Motor Works, quarterly, 2 per cent., payable August 1.

The New York Air Brake Company, quarterly, 1½ per cent., payable July 28.

The United States Motor Company, quarterly, 1¾ per cent. on preferred, payable August 10.

The United States Bobbin & Shuttle Company, quarterly, 1¾ per cent. on preferred, payable August 1.

Customs Decisions

Sheet Iron Drums or Containers

The Board of United States General Appraisers has handed down a decision favorable to the importers in a case affecting the classification of sheet iron drums used for containing caustic potash and bleaching powder. No question was raised regarding the duty imposed on the contents, but Balfour, Guthrie & Co., and Meyer, Wilson & Co., the importers, objected to the classification imposed by the collector.

Duty was assessed at the rate of 30 per cent. ad valorem under the provision in the tariff act for "cylindrical or tubular vessels or tanks for holding gas, liquids, or other material, whether full or empty." The importers alleged that the drums are "usual" coverings as that term is used in the law. Judge Fischer, in sustaining the contention, says that the evidence shows that the metal drums used in holding the merchandise, on being emptied of their contents, cannot be used commercially for any similar use and possess no value other than as scrap metal. The Government assessment is reversed.

Ecclesiastical Cast Iron Statuary

Claims by Benziger Bros., regarding the classification under the present tariff of cast-iron statuary for churches, have been overruled. The merchandise was assessed at the rate of 45 per cent. under the provisions for "manufactures of metal." Lower rates of duty were claimed, but these the board declined to entertain.

Sewing Machines

In construing the tariff act of 1909, the board has decided that the term "sewing machines" as found in the act is not restricted to the usual domestic article, but comprehends machines of all kinds that are employed in stitching generally. The protestants before the board were the Singer Manufacturing Company and C. B. Richard & Co. Some of the machines in controversy are used for stitching gloves, while others are used for sewing together straw braids. Duty was assessed at the rate of 45 per cent. under the provision for "manufactures of metal not specially provided for." The importers on the other hand set up the contention that the machines are "sewing machines" within the meaning of the law and dutiable at 30 per cent. and they were sustained.

Needles for Embroidery Machines

The board has decided that needles for imported embroidery machines, entered at the same time as the machines, are not to be regarded as entireties, and as such free of duty. The present tariff grants free entry to the machines, but needles are specially provided for with a tax of 25 per cent. ad valorem. An importer brought in the machines in controversy, and with each machine entered 60 dozen needles. The decision is that these needles must be taken separately and charged with duty.

New Publications

Metallurgy of Tin.—By Henry Louis. Size, 6 in. x 9 in.; 138 pages; 41 illustrations. Bound in cloth. Price $2 net. Published by the McGraw-Hill Book Company, 239 West 39th street, New York, and 6 Bouverie street, London, E. C.

This interesting book, the author states in his preface, is in the main a reprint of a monograph on the metallurgy of tin, published originally in Mineral Industry for 1896. Authentic information on the subject of tin smelting is somewhat scarce, and, as the volume of Mineral Industry has long been out of print, it was decided to issue the monograph as a separate work, incorporating in it as much recent information on the subject as was obtainable. Dr. Louis states that what he terms "the small amount of new matter" is due to two reasons: First, the unprogressive character of tin smelting, which continues from decade to decade with comparatively little change, and, second, the profound degree of secrecy observed by tin smelters, who are extremely anxious to keep to themselves any modifications or improvements in the process of smelting. To what extent, the author adds, these two facts, the slow advance of the industry and the secretive habits of those engaged in it, are related as effect and cause may be left to the judgment of the reader.

The subject is handled under five general heads: Properties and occurrence of tin; principles of the metallurgy of tin; smelting in the shaft furnace; smelting in the reverberatory furnace; and tin-plate and tin-plate scrap. This book is not only of value to those who produce tin from the ore but also to the very large class of manufacturers who use tin in their processes and products. Copious illustrations, many of them line drawings, assist in a clear presentation of the subject. The author brings the history of tin production from its earliest days down to the present year.

Cost Keeping and Scientific Management.—By Holden A. Evans, Naval Constructor, United States Navy. Size, 6 in. x 9 in.; 252 pages; 44 illustrations. Bound in cloth. Price $3, net. Published by the McGraw-Hill Book Company, 239 West 39th street, New York, and 6 Bouverie street, London, E. C.

This work comes at a time of large demand from manufacturers for a highly detailed text book upon which they can base a cost keeping and scientific management system. Much that has appeared previously has dwelt chiefly on the general principles of the subject, though some volumes have had a good deal of detail along certain lines. A very great work has been accomplished in stimulating interest in this most essential element of production. Mr. Evans has gone a little farther than most of his predecessors. His book is written primarily for jobbing shops and small manufacturing plants, among which accurate cost keeping and the principles of good management have received but little attention. At the same time it contains much which cannot fail to be of interest to officials of large manufacturing establishments and shipbuilding plants.

Many owners and managers, while desiring to improve their cost systems, are deterred by the belief that this cannot be done without the aid of expert accountants who will devise an elaborate system which will require a large clerical force to maintain. The purpose of this volume is to give to a manager knowledge of a system which he can adapt to meet the requirements of his own works. Mr. Evans describes the system in practical operation at the Mare Island Navy Yard over which he has supervision. He has succeeded in improving the efficiency of that plant by adopting and following the principles of management advocated by F. W. Taylor. He is convinced that in thousands of shops marked improvement would be made if these principles were followed, and he gives them in a practical, clear-spoken way which makes his words easy of understanding.

A very important feature is the combination of the table of contents and the index. In the former each of the 15 chapters is thoroughly subdivided so that they require three solid pages. The index is exceedingly voluminous, as it should be, occupying 12 pages. The result is a handbook of ready reference as well as a valuable text book. Take for example the chapter on machine shop methods; the subdivisions include general instructions, the results to be obtained by the planning department, the planning department and the shop staff, the duties of the chief planner, of the material man, the instruction card man, the standing order board man, the shop clerk, the study man, the foreman, the gang boss, the speed boss, the inspector, the move man, the head tool maker, the repair man and the belt man; delivery of tools to machines, operation of the system, and cooperation among the planners and shop staff. This very well suggests the scope of the work.

The illustrations include many sample blanks filled out more clearly to show the matter under consideration, and half-tones to make more understandable the different methods of assembling and keeping records, and also views in the works.

Iron and Steel: Their Production and Manufacture.—By Christopher Hood. Size, 4½ in. x 7 in.; 150 pages; 25 illustrations. Bound in cloth. Price 1s. 6d. net. Published by Sir Isaac Pitman & Sons, Ltd., 1 Amen Corner, E. C., London, Bath and New York.

This volume is one of a series of books known as "Pitman's Common Commodities of Commerce." It takes up the subject of steel and iron in a manner necessarily superficial, no attention being paid to finished manufactures save those which are made directly from the raw material such as rails, girders, bars and plates, and even these are treated in a very general way. The author's endeavor has been to consider the subject on broad lines for the benefit of those readers who are in need of a primer of the industry rather than a work of diffuse or specialized details.

The Revolution in Freight Claims.—The Railway Business Association, 2 Rector street, New York City, has issued its bulletin No. 8, entitled "The Revolution in Freight Claims," which is described as a "story of how by cooperation the shippers, the railroads and the Government have transformed a national grouch into fast spreading satisfaction." The association has accomplished broad reforms in the governing of the equitable settlement of freight claims against the transportation companies, and also in the education of shippers in the safe packing and clear marking of goods for shipment. The bulletin, in its 32 pages, gives substantial examples of the good already done.

The Chattanooga Manufacturers' Association

The Manufacturers' Association of Chattanooga, Tenn., is an organization which is proving of great value to the industries of the east Tennessee community. The association occupies its own building, and one of the features of its work is the maintenance of an exhibit hall in which are displayed permanently the products of the manufacturing interest of the city.

The iron trade is well represented in the display. Among the companies which are prominent in the exhibits are the Casey-Hedges Company, Walsh & Weidner, Wheland Machine Works, Chattanooga Wheelbarrow & Truck Company, American Brake Shoe & Foundry Company, Cahill Iron Works, M. A. Hunt & Co., Chattanooga Boiler & Tank Company, Chattanooga Implement & Mfg. Company, Chattanooga Plow Company, Chattanooga Roofing & Foundry Company, Gustafson Mfg. Company, Eagle Saw Works, Converse Bridge Company, Chattanooga Saw Works, and Southern Skein & Foundry Company.

The value to those in the trade of the exhibit is said to be patent immediately, as the visitor to Chattanooga, seeking information as to its industries, usually finds in the exhibit some indication of what he is looking for. A lot of new business, which would probably never be developed otherwise, continually results from the display.

In addition to this feature of its work the association has made itself valuable by its traffic department, which is equipped with information as to rates, and handles claims against the railroads for overcharges, as well as petitions for reductions in rates, etc. The iron manufacturers who are connected with the association are enthusiastic over its work, and assert that they themselves would be willing to assure its support, even if the other industries of the city were not to continue in its membership.

Personal

Fred C. Deming has been appointed manager of sales for the Carnegie Steel Company, the Illinois Steel Company and the Tennessee Coal, Iron & Railroad Company for the Buffalo district, effective August 1. He has been assistant manager of sales for the same companies in that district for several years and now succeeds T. Guilford Smith, retired. Mr. Deming has been connected with the Carnegie Steel Company since 1892, in various capacities, at the Buffalo office. Prior to that time he was in the service of the Philadelphia & Reading Coal & Iron Company, with which Mr. Smith was also connected. He has therefore been associated with Mr. Smith in these two companies for 27 years. The Buffalo offices, of which Mr. Deming will have charge, will as heretofore be located at 203 Ellicott Square Building.

The Youngstown Iron & Steel Company, Youngstown, Ohio, held its annual stockholders' meeting July 18. The year just closed was reported as a very successful one in every particular. The following directors were elected: L. E. Cochran, John O. Pew, Mason Evans, H. W. Heedy, C. B. Cushwa, G. F. Danielson and G. A. Cochran. The directors organized by electing the following officers: L. E. Cochran, president; John O. Pew, first vice-president and general manager; H. W. Heedy, second vice-president; Mason Evans, treasurer; C. A. Cochran, secretary; C. B. Cushwa, general superintendent; C. F. Danielson, superintendent of pressed steel department. The company now has its new additions, consisting of jobbing and plate mill, operating satisfactorily.

Francis H. Love, 116 Broad street, New York City, is preparing to open a manufacturers' agency in Havana, Cuba, with the purpose of covering the West Indian territory, specializing on a few high-class hardware and metal lines. He will leave for Havana about September 1.

T. W. Guthrie, formerly president of the Republic Iron & Steel Company, has been made general manager of the Standard Welding Company, Cleveland, Ohio, succeeding the late W. S. Gorten.

Hugh P. Tiemann, Pittsburgh, Pa., has been entered as a member of the Committee on Nomenclature of Iron and Steel, Committee No. 24, of the International Association for Testing Materials.

Dr. Milton S. Hersey, City and Provincial Analyst of Montreal, has accepted the appointment as Mandatory in the Council for Canada of the International Association for Testing Materials.

S. E. Harvey, formerly with the Niles-Bement-Pond Company, has become associated as sales manager with the Rumely-Wachs Machinery Company, 121 North Jefferson street, Chicago, dealer in new and second-hand machine tools.

Ewald Killing, of the Killing Molding Machine Works, Davenport, Iowa, has just returned from a trip abroad. While there he was successful in placing agencies for Killing molding machines in Germany, Russia, Austria-Hungary and the Scandinavian peninsula.

H. W. F. Graham has been recently elected general secretary of the Butler, Pa., Chamber of Commerce, succeeding L. C. Getsinger, of Pittsburgh, who recently resigned to become general secretary of the Shenango Valley Chamber of Commerce, at Sharon, Pa., which town is to raise a large fund for the purpose of securing industries. Butler, Pa., has a fund of $600,000, which is used to further the interests of that town.

The organizing committee of the sixth congress of the International Association for Testing Materials has elected Dr. Henry M. Howe, president; Robert W. Lesley, vice-president; H. F. J. Porter, secretary, and Prof. Edgar Marburg, treasurer.

The Pelican Metal Roofing Company, New Orleans, La., having a large volume of work in the locality, has opened a branch of its sheet-metal and roofing business at 2303 Fourth street, Meridian, Miss. The company has a cotract for all the metal ceiling and metal shingles on the Meridian State Fair Building, amounting to thousands of squares of sheet-metal work.

Obituary

WILLIAM R. GAULBERT, of Gaulbert & Caskey, operating the Fairhill Rolling Mills, Philadelphia, Pa., died at his home in that city July 22, of acute indigestion, aged 79 years. He was born in Passayunk Township, adjoining the old city of Philadelphia. He began his career in the iron business in 1874, when he became a member of the firm of Gaulbert, Morgan & Caskey, and while several changes have resulted in the personnel of the firm, through deaths of various members, Mr. Gaulbert continuously gave his active attention to the business, and for a long time had been senior member of the firm. He was a member of the Columbia Club and the Historical Society of Pennsylvania, and had for years been a director of the Second & Third Street Passenger Railway. He leaves three daughters.

SAMUEL H. KEEFER, a valued employee of the Niles-Bement-Pond Company, died at Plainfield, N. J., July 19, aged 30 years, following an operation for appendicitis. After graduating at Stevens Institute in 1906 he took the special apprentice course of the Niles-Bement-Pond Company, and at the time of his death was its chief electrical engineer and a recognized expert in his line. In the past few years he had designed a reversing motor planer, which is already well known to users of machinery, and other electrical improvements in machine tools which are now in process of development. He leaves a widow and a son.

GEORGE A. F. HUGHSON, president of the Hughson Steam Specialty Company, Chicago, died July 19 at his home in that city, aged 51 years. He was formerly vice-president of the John Davis Company, and when that company was sold the business was continued under Mr. Hughson's name. He leaves a widow and one son.

CLARENCE M. KEMP, president of the Kemp Mfg. Company, Baltimore, Md., died July 24, aged 58 years, following an illness of several months. He leaves a widow, two sons and a daughter.

JOSEPH K. LANMAN, Hartford, Conn., formerly treasurer of the Hartford Machine Screw Company, died suddenly July 23, aged 52 years. He was with the company for 30 years and treasurer for 15 years, until he retired six years ago, since which time he had devoted himself to other interests. He was unmarried.

A house organ devoted to the electrical industry, printed in the English language and published in Berlin, has made its way to this country under the name of A. E. G. Journal. The July issue is No. 1, of volume 1, and the singular thing is that the recipient, unless he is familiar with foreign activities in the electrical field, would not know the source of the journal. It is of course printed in the interest of the Allgemeine Elektricitäts Gesellschaft.

The Allegheny Steel Company, Pittsburgh, Pa., at a recent meeting of its stockholders voted favorably on the proposition to increase the capital stock from $3,000,000 to $3,500,000. The new stock will not be issued until later on. The company has made considerable improvements in its plant at Brackenridge, Pa., by extending its steel-casting department, adding to its sheet-mill capacity for the production of American ingot-iron sheets and electrical sheets, enlarging its plate-washer department, etc.

At the recent annual meeting of the Cleveland Engineering Society the following officers were elected for the ensuing year: President, E. P. Roberts; vice-president, R. H. Fernald; secretary, F. W. Ballard; treasurer, E. E. Ranney; librarian, G. H. Tinker; directors, the officers and G. F. Burrows, Col. John Millis, B. F. Leffler, A. H. Himes, Robert Hoffman and J. W. Frazer.

The Lackawanna Bridge Company is not to erect any plant for itself at Bayonne, N. J., as reports have it. The rumor, it is felt, arose through the fact that the company is to erect the two-story warehouse at Bayonne for the American Radiator Company, performing the entire general contract as well as erecting the steel work.

Making Machines Earn Their Living

A Correct Distribution of Costs

BY STERLING H. BUNNELL.

In the endeavor to obtain the best working efficiency from all parts of the factory organization more attention has been given to the workman and his working conditions than to the equipment with which he works. The average small shop, containing several machines of different sizes and values, having different requirements in power, floor space, light, crane service and other essentials, is operated without any conception on the part of the proprietor that some of his machines must earn more than others.

Obviously, a machine costing several thousand dollars, taking large floor space, requiring part of the time of an overhead crane to place and remove work, using much power and requiring considerable expense in connection with the cutting tools and fixtures belonging to it, should earn a much larger wage per hour than a small machine involving each of these expense items in very small measure. This is no mere theoretical question for accounting specialists.

In a jobbing shop, where there is a variety of tools, making it possible to take in moderately large and rough work or small and fine work, according to what is offered, the securing of a contract for heavy work may tie up the entire time of the larger machines and leave vacant a good part of the floor space ordinarily occupied by visehands and fitters. On the other hand, the entering of orders for a large quantity of small work may leave the large tools standing idle. It is important to any shop, however small, to know what the several machines are worth as they stand on the floor, what it costs to operate them and what price shall be set on the services of each machine outside of the amount of wages paid the operator.

Analyzing the Elements

To analyze the various elements entering into the hourly value of the time of the machine in a large works is a task of much importance. Competent cost accountants are available to undertake the problem of any factory, and the figures produced in such an investigation may be so arranged that necessary changes may be made at any time without again calling upon the original investigator. In a small shop, however, the elements involved are so few that it is no impossible task for any competent bookkeeper or for a man with some knowledge of costs to make the necessary analysis without calling on outside help.

The elements entering into the fixed expense of a factory, and therefore into the fixed expense of each unit or machine in a factory, are interest on invested capital, depreciation, taxes, insurance, power, heat, light, superintendence and repairs. Each of these items of expense for the factory as a whole is easily computed. A fixed interest should always be provided for the invested capital, as the value of the plant represented by stock is entitled to the market rate of interest at least.

Depreciation is overlooked by many men who ought to know better. During half the lifetime of the average man interested in shop work machine tools of some types have gone out of existence and others have taken their places. Let any man who thinks that proper attention to repairs and up-keep is a sufficient substitute for a depreciation charge compare the machine shop equipped with tools made in the 90's with a shop equipped with tools made since the requirements of high-speed steel became generally known. No matter how well kept are the machines made 20 years ago, few of them can hold their own today against modern tools. The older machines might just as well have been driven to their limit and worn out in producing their quota of work in half the number of years, as saved to a time when their design is obsolete and they must be replaced by the machines of today.

List of Productive Units Required

To analyze the expenses of a shop a list of productive units is the first thing required. By "productive unit" is meant a single machine, or a single working equipment for one man, such as a vise hand, including the bench, vise and tools and the floor space in which he stands and handles his work. In some cases productive units may be formed of larger sections of the shop or factory, as where a number of machines of identical pattern are working together on the same kind of work, so that their output may be measured in one number or count. This is the case, for instance, with some of the machines used in a tannery, where three or four thousand sides of leather are handled by several identical machines, each doing part of the whole number.

Having drawn up a list of the productive units, a sketch is to be made of the floor space of the factory, dividing it among the several productive units, leaving out any large areas which do not appear to belong properly to adjacent machines, such as a space necessary for transporting material on trucks, for storing castings not required in the immediate vicinity and the like. Next, compute the floor space in square feet covered by the areas as they are marked off about each productive unit and tabulate these opposite the names of the units.

Footing up the column of floor space figures, the total gives the productive floor space of the factory and forms the basis for dividing the expense connected with the building. This is interest on the building cost. It may also include ground rent, this charge standing in place of interest on land value, or the rent paid for land and building, if the whole property is rented, and insurance and taxes on the building. The total of these items, divided by the number of square feet of floor space occupied by productive machinery, gives the annual charge per square foot of floor space. Multiplying the square foot charge by the area of the space occupied by each productive unit, the annual charge for the building space of each is obtained.

The actual value of the equipment, machinery, shafting, building and accessories directly belonging to it, and of any other shop property which may be located within the space and belong to the productive unit, is next to be taken as a basis for computing interest and depreciation on the value of the equipment. Insurance and taxes are ascertained in a similar way, dividing the annual total on the basis of value of each unit.

Dividing Up the Horse Power

The estimated horse power required by each machine, running the number of hours, is next set down in a column and the figures totaled. If the guess has been accurate the number of h.p. hrs. will agree closely with the h.p. hrs. paid for. The power may be purchased from outside or made by a power plant belonging to the factory; in either case the basis for distributing the total cost of the power is the h.p. hrs. required for the operation for each machine.

If the total of powers does not agree closely with the actual power developed the estimated figures may be changed proportionately, so as to make the total come out right. The cost of power per h.p. hr. is then multiplied by the figures opposite each productive unit and the amounts set down as an element of the burden charge for the unit. This distribution is not by any means put forth as perfectly accurate, but will give satisfactory results for the small factory which will not carry the expense of a complete cost-accounting system. It would be strictly correct to distribute power on the basis of the actual hours run by each tool each day, but this involves some extra figuring and in most cases does not appreciably affect the general result.

The cost of heat and light is divided on the basis of floor space. If the factory is heated by exhaust steam furnished by its own engine it is fair to charge half the cost of steam power against the power consumption of the tools and the other half against the cost of heat. In such cases there should be two figures carried for the purpose of distributing power charges, one consisting of the cost of power for each tool and the other of the cost of heat and light over the area covered by each productive unit.

The Non-Productive Space

The charges for the non-productive space, for the light in the office and for any other non-productive items should not be left out of the calculation, but set down separately. To any such undistributed charges should be added the expense for salaries and office supplies, miscellaneous expense not distributable to the machines and any other undistributable items. The total of these figures gives the amount of overhead burden, which is fairly distributed as a percentage over the gross cost of the work turned out.

This percentage will be very much smaller than is the case where the old erroneous method of distributing all of the factory expense as a percentage to the cost of labor is in use.

The repair charge for the plant should be considered as distributable equally over all the machines unless there are certain special machines which are likely to have a greater proportion of percentage of expense to keep them in order. The ordinary breakages and repairs from wear which occur in a plant happen on any one machine rather than another only by chance. It is therefore fair to distribute the total repair cost of the plant per year, estimated from previous years' results, as a percentage over the value of the equipment. The total cost may be found to be 5, 10 or 15 per cent. of the total value of the equipment, and the figures for the proportion belonging to each unit are computed at the percentage indicated.

Repairs to small tools, such as drills and steel cutters, including the wages of the man in charge of the tool room, can best be distributed by estimate, setting down opposite each productive unit the estimated cost of the tools required for it and then comparing the total of the estimated figures with the results of previous years or of other shops and adjusting the estimates if necessary.

The Table of Burden Figures.

The table of burden figures is now added across, combining all the items opposite each productive unit into an annual sum covering the total fixed charges and the operating expense. These figures are annual amounts and if divided by the expected working time of the factory per year give hourly rates which must be earned by each machine if it is to justify its presence in the shop.

It is true that special machines are required in some circumstances to perform operations necessary to the work of the shop, even though not enough work is on hand to keep them fully employed. This does not affect the fact that such machines do not earn their "living" and that their deficit must be made up by the extra work of other machines, just as is done by the members of a fraternal organization who contribute to the support of one of their number who is disabled.

If the actual working time of each tool is noted each week or month, as should always be done, it is easy to see whether the tool or "productive unit" is carrying its full share of the burden. The failure of any unit to earn the required amount should be a spur to the management to find some way to employ that unit more continuously and produce better results. A tool half idle is an item of loss—a space where full efficiency has not been realized. There is no surer way to increase profits than to increase the working time of tools and equipment already paid for and in place and ready for operation, but hitherto allowed to stand idle and waste their earning powers.

Schedule of Burden Rates.

The following table is computed for a small shop equipment to illustrate the correct method:

Schedule of Burden Rates Computed for a Small Shop Equipment.

Unit.	Space.	Value Bldg.	Value Mchy.	Int. 6%	Dep. 5%	Tax 3%	Ins. 2-10%	*Power	Supplies	Repairs 5%	Total.	Av. Hrs.	Hour Rate.	Rate Set.
Shaper	50	$141	$500	$38.46	32.05	19.23	3.21	150.00	15.00	32.05	290.00	2000	14½c	15c
Drill	50	141	300	26.46	22.05	13.23	2.21	125.00	35.00	22.05	246.00	2500	10	10
16-in. Lathe	75	213	450	39.78	33.15	19.89	3.32	150.00	20.00	33.15	299.29	2500	12	12
24-in. Lathe	100	284	800	65.04	54.20	32.52	5.42	240.00	30.00	54.20	481.38	2000	24	25
Miller	60	170	450	37.20	31.00	18.60	3.10	75.00	50.00	31.00	245.80	1500	16.4	20
Benches (3 men)	200	568	110	40.68	33.90	20.34	3.39	†10.00	50.00	33.90	192.21	8000	2.4	2½
Unused	100	283	...	16.98	14.15	8.49	1.42	†5.00	....	14.15	60.19	....		
Building	635	1800	....	....	....	....	....	....	....	....	.....	....		
Totals	...	...	$2610	264.60	220.50	132.30	22.07	755.00	200.00	220.50				

Other Expenses:
Salaries and office..... $2,200.00
Misc. Expense..... 150.00
Fixed Charges on N. P. Space.. 60.19

$2,410.10 ÷ $16,000 annual production = 15% overhead per cent.

*Power at 5c per hp-hour, per electric service bills.
†Allowance for light over vises and nonproductive floor space.

Heat Treatment of Low-Carbon Nickel Steels

A paper on the heat treatment of low-carbon nickel steels, under the joint authorship of Prof. Henry Fay, of the Massachusetts Institute of Technology, and John M. Bierer, was read at the evening session on June 27 of the American Society for Testing Materials, at Atlantic City, N. J. Two open-hearth steels, one containing 3.15 per cent. and the other 3.5 per cent, nickel, were studied, and as shown by the analysis herewith were steels of substantially the same carbon content. Bars ⅞ in. in diameter and 5 in. long were treated. After treatment they were cut into the standard 4-in. test specimens, the 1 in. of the end being reserved for microscopical examination.

Analysis of the Nickel Steels.

	No. 1.	No. 2.
Nickel	3.15	3.5
Carbon	0135	0.34
Manganese	0.63	0.60
Silicon	trace	0.16
Phosphorus	0.027	0.03
Sulphur	.016	0.014

Each set of three specimens was placed in the cool furnace and finally held at desired temperature for a period of 2 hr. At the end of the time, one was quenched in oil, a second was allowed to cool rapidly in air and the third was allowed to cool slowly in the closed furnace. The oil quenched specimens were subsequently annealed 2 hr. at 600 deg. C.

The oil quenched specimens gave the highest values for tensile strength, elastic limit and reduction of area and the next highest values were found in the air cooled specimens. The exception was that the 3.14 per cent. nickel steel, heated to 700 deg. C., showed a lower tensile strength and elastic limit than the corresponding air-cooled specimen. This was explained by the fact that oil quenching from 700 deg. had practically no hardening effect.

It was noted that the maximum values were reached at a temperature considerably above the critical temperature. This was not taken to mean that heating to high temperatures was desirable, but that it was perhaps advisable to heat higher than the critical temperatures, at which some writers seemed to think best results were obtained. This did not accord with the author's experience except for high-carbon steels. The most suitable temperature for the heat treatment lay, the authors asserted, between 800 and 850 deg.

In the case of the 3.5 nickel steel, greater values for strength may, they stated, be obtained at the higher temperatures, but at the same time the structure of the steel becomes coarser, due to the higher heating. The microstructure of the steels was similar to that of carbon steels. Little or no change of the original structure was produced with 2 hr. annealing at temperatures below 750 deg. and the physical values were changed only slightly. At 800 deg. there was a change and specimens showed an extremely fine structure. At temperatures above 850 deg. the structure begins to grow coarse. In specimens oil quenched at 1000 deg., there was no granulation, but there was evidence of crystallization. Prolonged heating, it was thought, would produce a coarser grain except in specimen oil quenched between 800 and 900 deg. C.

The Pittsburgh Crucible Steel Company's engineers have completed plans and specifications for part of the equipment required in its new steel works to be erected at Midland, Pa., and bids are now being taken for the construction of six open-hearth furnaces and a 40-in. blooming mill. Plans being made up also call for a large increase in boiler and engine capacity and for finishing mills. Ground was broken some time ago for the new buildings and the steel work will shortly be started by the American Bridge Company. Foundations are also in for a second blast furnace, while the complete lay-out is made for a plant of four blast furnaces.

The Steel Corporation Investigation

Chairman Stanley Acquiring Technical Knowledge

Herbert Knox Smith, Commissioner of Corporations, appeared July 20 before the Stanley Committee at Washington, but the effort on the part of the committee to obtain some information that Mr. Smith may be supposed to have after assembling the data furnished to his bureau by the United States Steel Corporation was fruitless. Mr. Smith maintained that the law did not permit him to give any of the information to any one except the President. He said that the Steel Corporation had placed no obstacles in the way of getting information about its business, but the bureau had put nobody under oath for fear that act would grant immunity from prosecution. Only a part, he said, of the figures and data gathered had been laid before the President, and the task of arranging the rest would involve much time and labor.

Chairman Stanley asked Mr. Smith: "Will you please take this matter up with the President and learn if he is willing for this committee to have your information?" Mr. Smith promised to take the matter up with the President.

Representative Littleton declared it was "an outrage that the Bureau of Corporations is to-day responsible that all this information we seek is impounded and kept away from other branches of the government." He said the law as interpreted was a "monstrosity."

Chairman Stanley read a speech of Judge Gary, chairman of the Steel Corporation, made to the board at a meeting in 1906, relating to the government's investigation. In this Mr. Gary said:

> Our Finance Committee has been in close touch with this matter all the time. We have been in frequent and almost constant communication with Commissioner Garfield and more or less with the President himself concerning these matters. Up to date they have made no complaint of us whatever, but we do not know any better than you do what may be the future. We are trying to be frank, accommodating to the department, and we suppose we have an understanding that we will not be unnecessarily injured and that we will not wrongfully be charged without having an opportunity to show the facts.

Mr. Smith was asked about this statement and said he knew nothing about this matter. Representative Gardner, of Massachusetts, asked if Mr. Stanley meant to imply that President Roosevelt and Commissioner Garfield had been in collusion with Steel Corporation officials. Mr. Stanley replied he meant to imply "unseemly activity" of the Steel Corporation.

Chairman Stanley, who has been making some inquiries in and near Pittsburgh, told the committee that he had found that the Steel Corporation has no monopoly of coking coal, but that its absorption of the Tennessee Coal, Iron & Railroad Company had "cinched" its monopoly of ores. He said:

> I found on personal investigation that the Jones & Laughlin Steel Company controls nearly as much of the coking coal in the Connellsville district as the Steel Trust does. I am also informed that M. V. Thompson owns a greater acreage of that coal than does the Steel Corporation, and that he holds it for sale to independents as well as to the trust.

Mr. Stanley then made some statements which will amuse those who are familiar with the iron ore deposits of the country and with steel-making processes. He referred to what he termed the "act of God" to relieve the independents in the discovery of self-fluxing ores in the South, which developed the open-hearth system of making steel and opened the way for competition with the Bessemer ores of the Superior region controlled by the "trust." He said 80 per cent. of the open-hearth ores were controlled by the Tennessee Coal, Iron & Railroad Company. He then questioned Mr. Smith as follows:

Q. Is it not true in the light of the facts that when the United States Steel Corporation absorbed the Tennessee company the latter controlled the only ores that could enter into competition with Bessemer ores?

A. It controlled the most important bed of the Southern ores.

Q. If the Steel Corporation had a monopoly it practically cinched it through the absorption of the Tennessee company. Is that not true?

Commissioner Smith said he did not want to commit himself and that all of the facts in the bureau's possession would be submitted in due time.

Chairman Stanley submitted a copy of a steel plate pool agreement at the hearing July 24. This agreement was made by the manufacturers of steel plates November 9, 1900, about a year before the formation of the Steel Corporation, but the committee hopes to be able to prove that the terms were adhered to down to 1906 "and possibly in some form to this time." The agreement was obtained from F. B. Kauffman, publisher of the Chester Valley Union, Coatesville, Pa., who declares that his brother printed it. It is asserted that the agreement was sent out to the manufacturers, but that the copy in each case was returned unsigned and all later were burned for fear that they might furnish evidence of a violation of the Sherman anti-trust act; but the return of the contracts in this manner, it is alleged, was the signal that the contract had been agreed to and that its terms were then kept by a tight combination of the existence of which there was no visible proof.

According to the paper, this organization included 11 steel companies, which apportioned among themselves all shipments of steel plates. Each was required to make monthly sworn statements relating to shipments, production, etc., and any member which shipped more than its apportioned amount was required to pay a penalty on each pound of such excess, the money thus collected being apportioned among the members that did not ship up to their allotted share. The agreement showed the following apportionment of shipments allowable by the various concerns: Carnegie Steel Company, 46.25 per cent.; Jones & Laughlin, Ltd., 4.75; Illinois Steel Company, 11; Crucible Steel Company of America, 4.50; Otis Steel Company, 2.50; Tidewater Steel Company, 3; Lukens Iron & Steel Company, 7.50; Worth Brothers Company, 7; Central Iron & Steel Company, 8; American Steel & Wire Company, 5.50, and Glasgow Iron Company to the extent of sales and up to 40,000 tons, should it be able to accomplish them, prior to December 31, 1901. Debts of members of the association were required to be paid by check drawn to the order of T. Mellen & Sons, Pittsburgh, to the credit of the association.

Another provision required that "all plates shipped into States bordering on the Pacific Coast, and to be actually used in the territory into which thus shipped, and also all plates actually exported for use outside the limits of the United States, be reported to a commissioner, together with bills of lading or other evidence of exportation, for actual use abroad, satisfactory to him (said evidence to be confidential and not to be circulated among members)." Such tonnage was to be deducted from the member's report and the agreed pool tax charged. The agreement also bound the members to make sales between parties to the agreement at pool prices.

To insure rendering of statements and faithful adherence of each party to the terms of the agreement, a guarantee fund of $100,000 was provided by payment of $1,000 on each per cent. of allotment.

At the hearing July 25, the formation of the Steel Plate Association of the United States in New York in the autumn of 1900 was admitted by A. F. Huston, president of the Lukens Iron & Steel Company, one of the organizers.

"Where did you see this agreement before?" asked Representative Beall, of Texas, displaying the copy now on the official record of the inquiry.

"When it came from the printer."

"Who sent it to the printer?"

"I did."

Mr. Huston said his company participated in the discussions leading up to the agreement and of the organization of the association. "Prior to that time," he explained, "we had had a period of destructive competition. I shall never forget that time—common labor was at 90 cents to $1 a day, the price of steel was down to a cent a pound, and, in selling, the value of ore in the ground was not taken into consideration at all. The companies figured only on the cost of getting the ore out and manufacturing it. That agreement was a life-saving measure."

Further admission of the existence from November 2, 1900, to November, 1905, of an association along lines similar to the pool was made by W. C. Moreland, of Jones & Laughlin, Ltd. Mr. Moreland submitted an account of his company with the association and said his records contained actual figures of moneys paid to Willis L. King, treasurer of the pool.

United States Steel Corporation's Earnings

The statement of the United States Steel Corporation's earnings for the quarter ended June 30, 1911, makes the following showing, as compared with the corresponding period of 1910:

	1911.	1910.
April	$9,412,573	$13,414,956
May	9,590,444	13,229,289
June	9,105,503	13,526,715
Total after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants, and interest on bonds and fixed charges of the subsidiary companies	28,108,520	$40,170,960
Less charges and appropriations for the following purposes:		
Sinking funds on bonds of subsidiary companies and depreciation and reserve funds	6,268,680	6,290,205
Net earnings	$21,839,840	$33,880,755
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding	$5,783,293	$5,849,363
Sinking fund for the quarter on U. S. Steel Corporation bonds:		
Installments	1,012,500	1,012,500
Interest on bonds in sinking funds	516,170	450,099
	$7,311,963	$7,311,962
Balance	$14,527,877	$26,568,793
Dividends for the quarter:		
Preferred	6,304,919	6,304,919
Common	6,353,781	6,353,781
Surplus for the quarter	$1,869,177	$13,910,093
Less appropriated on account of expenditures for property, new plants and construction	.....	7,500,000
Balance of surplus for the quarter	$1,869,177	$6,410,093

The earnings for the quarter ended March 31, 1911, were $23,519,203. For the half year the total earnings were, therefore, $51,627,723, against $77,787,837 in the first half of 1910.

Important Freight Rate Reductions

The Interstate Commerce Commission published a decision July 24 making substantial reductions in freight rates affecting practically every railroad in the United States with the exception of those operating in certain parts of Southern territory. The decision is based on what are known as the Reno, Spokane, Salt Lake and similar cases. In the Reno and related cases the carriers have until October 15 to put the reduced rates into effect. In the Spokane and related cases November 15 is the date fixed. Roughly estimated the reductions amount to 20 per cent. Hundreds of thousands of rates are involved, and the cases are of such magnitude that even members of the commission are unable to indicate precisely how many rates or the amount involved in a given group will be affected by the decisions.

In these cases the commission for the first time has established freight zones which are described. Under present conditions a commodity rate from the Missouri River to Spokane is the rate from a Missouri River point to the Pacific Ocean, plus a back haul from the Pacific Coast points to Spokane. From the Missouri River to certain intermediate points eastward from the Pacific Coast the commission prohibits a back haul charge.

The territorial zones named by the commission are as follows: Zone 1 comprises all territory west of a line extending in a generally southerly direction from a place immediately east of Grand Portage, Minn., thence southwesterly to a place immediately east of Superior, Wis., thence southerly to the intersection of the Arkansas and Oklahoma state line, and thence along the west side of the Kansas City Southern Railway to the Gulf of Mexico, in which zone the commission holds that no higher charge can justly be made at any intermediate place than to a more distant place.

Zone 2 begins at the international boundary immediately west of Cockburn Island, Lake Huron, and passes westerly through the Straits of Mackinaw, southerly through Lake Michigan and south to Paducah, Ky., whence it follows the east side of the Illinois Central Railroad to the Gulf of Mexico in which zone rates to intermediate points may properly exceed by not more than 7 per cent, rates in the same places of origin to Pacific Coast terminals.

Zone 3 embraces all territory lying adjacent to the Buffalo-Pittsburgh Line running from Buffalo to Wheeling and thence following the Ohio River to Huntington, West Virginia, in which zone the commission holds that from places of origin in this territory rates to intermediate places may properly exceed those to terminal places by not more than 15 per cent.

Zone 4 embraces the Atlantic seaboard east of the Allegheny Mountains in which the commission holds that rates from places of origin within the zone to intermediate places may exceed those to terminal places by not more than 25 per cent.

It is decided that transcontinental carriers serving Reno and other points on the main line of the Central Pacific shall make no higher charge on any article carrying a commodity rate than is contemporaneously in effect from Missouri River points such as Omaha and Kansas City to coast terminal points.

East Texas Iron Ore Developments

ORE CITY, TEXAS, July 22, 1911.—Another step toward the development of the iron ore deposits of northeastern Texas has just been taken by the East Texas Brown Ore Mining & Development Company in awarding the contract for the erection of an ore-crushing and washing plant at this place. The plant will have a daily capacity of 1000 tons of ore and will cost about $50,000. Besides the ore for shipment that will be obtained by this process a large output of rock ballast for railroads will be obtained from the plant.

The company expects to have everything in readiness for beginning to ship ore to Bethlehem, Pa., via Port Bolivar, Texas, by October 1. The railroad that is being constructed by the Port Bolivar Iron Ore Railway Company to Ore City from Longview, 34 miles, will be finished by that date, as will also the ore docks which the Atchison, Topeka & Santa Fe Railroad is constructing at Port Bolivar. The Port Bolivar Iron Ore Railway Company is a Santa Fe project, and its road will connect with the latter line at Longview. The East Texas Brown Ore Mining & Development Company owns extensive iron ore deposits in this vicinity as well as in other parts of Cass County and in Marion, Gregg and Upshur counties. While Charles M. Schwab is not named as one of the incorporators of the new company, it is understood that he is the dominant factor in the project. The capital stock of the company is $2,500,000. The officers are: Lewis P. Featherstone, Galveston, president; L. C. Luckel, Houston, secretary; Fox Winnie, Galveston, treasurer. Mr. Featherstone has long been prominently identified with the Texas interests of the Santa Fe. Mr. Schwab made a personal investigation of the iron ore deposits around Ore City some time ago, and it was announced at that time that he had contracted with the Santa Fe for the transportation to Port Bolivar of an enormous tonnage of the ore. H.

The Illinois Coal Report.—The Illinois Bureau of Labor Statistics has issued the twenty-ninth annual coal report, covering the year 1910. The 537 pages go into the subject of coal mining in voluminous detail. The names, production and characteristics of each mine are set forth in tables. Much attention is given to accidents. The Cherry Mine disaster alone has 60 pages, with line drawings to make clear the character of the premises. Another interesting chapter contains an address by David Ross, secretary of the bureau, on "Laws Covering Accidents and Employers' Liability," delivered at the American Mining Congress, Goldfield, Nev., last September.

Spelter Production in the First Half of 1911.—Statistics compiled by the United States Geological Survey show that the production of spelter or metallic zinc from ore for the first six months of 1911 was 140,196 net tons, a gain of more than 5000 tons over half the record output of 1910. Of this production, 5135 tons was made from foreign ore. Spelter stocks were reduced from 23,232 tons to 17,788 tons. Imports remained about the same, but exports were nearly double those of half the preceding year. The apparent consumption of spelter was 135,497 tons, an increase of more than 12,000 tons over the half of 1910, but about the same as in half of 1909.

Coke Production and By-Products Saved

During 1909 and 1910, according to E. W. Parker, of the United States Geological Survey, there was more activity in the construction of by-product recovery coking plants than at any time since 1903. While the total production of coke in 1910 was 41,681,410 net tons, the production of coke in by-product ovens in that year amounted to 7,138,734 net tons, against 6,254,644 tons in 1909. The increase in the output of by-product coke in 1910 over 1909 was 14.13 per cent., whereas the total production of ordinary coke increased from 33,060,421 tons to 34,570,076 tons, a gain of 1,509,655 tons, or only 4.57 per cent. The coke made in by-product ovens in 1910 was 17.12 per cent. of the total production.

The efficiency of by-product ovens is shown by the fact that while the beehive ovens in 1910 produced 34,570,076 net tons of coke on a consumption of 53,559,285 net tons of coal, or 64.54 per cent., the retort ovens in the same year produced 7,138,734 net tons of coke on a consumption of 9,529,042 net tons of coal, or 74.9 per cent.

The total value of the by-products obtained from the manufacture of coke in retort ovens in 1910 was $8,479,557, or a little more than one-third of the value of the coke produced—$24,793,016. In 1909 the value of the by-products amounted to $8,073,948, and in 1908 to $7,382,299. The by-products recovered in 1910 consisted of 27,692,858 cu. ft. of surplus gas, valued at $3,017,908; 66,303,214 gal. of tar, valued at $1,599,453; 70,247,543 lb. of ammonium sulphate, or its equivalent, valued at $1,841,062; 20,229,421 lb. of anhydrous ammonia, valued at $1,725,266, and 4,654,282 gal. of ammonia liquor, valued at $295,868. In addition to these, a quantity of light and secondary oil and small quantities of coke breeze are recovered, with an estimated value of $400,000. The value of the recoverable but wasted contents of the coal made into coke in beehive ovens would, at the prices obtained in 1910, have been between $35,500,000 and $40,000,000.

If all of the coke made in the United States were produced in retort ovens, says Mr. Parker, probably not more than half of the number of ovens would be required, say, for 1910, 45,000 ovens. These would yield in gas, over and above that required for the regeneration of the ovens, without by-product recovery, approximately 1,000,000 hp. per hour for every day in the year.

The first ovens of the by-product type in the United States were built in 1893 at Syracuse, N. Y. From this one plant there has been an increase to 4078 by-product ovens in 1910, all but 27 of which were in active operation. This is an increase of 164 over the number in operation in 1909 and 399 more than were in operation in 1908.

The Swedish Iron Institute

Consul Stuart J. Fuller, Gothenburg, Sweden, furnishes the Daily Consular and Trade Reports with the following description of the scope and functions of the Järnkontoret, translated from a publication issued by the Swedish General Export Association:

The Järnkontoret, or Iron Institute, is a private institution, peculiar to Sweden, and has for its object the support and advancement of the Swedish iron industry. Most of the iron works in Sweden are partners in the institute (the partnership being confined to the works exclusive of individuals), and their shares are estimated on the output of iron each has been able to register at the time of joining.

The institute is supervised, in the first place, by the Brukssocieteten (Society of Manufacturing Estates), a general meeting of which is held once a year. Every sole or joint proprietor of a manufactory holding shares in the Järnkontoret is a member of the Brukssocieteten. At the general meetings of this organization the votes depend on the shares held in the institute.

The affairs of the Järnkontoret are managed by a council consisting of five ordinary and five vice members, the latter being called only when matters of great importance are under discussion. The current work is superintended by two of the ordinary members, one as managing director and the other as "delegate on duty."

An ordinary banking business is carried on, and members are entitled to certain privileged loans (advances, accident loans, and building advances). They also have the privilege of receiving further loans before other applicants.

The institute possesses funds amounting to $1,911,093, which have accumulated from subscriptions and entrance fees as well as from the profits made on the banking business. The subscriptions, the so-called Järnkontorsdalern, are still fixed at 2½ öre ($0.0067) per centner (93.7 pounds) of the originally registered output. No dividends are paid to the partners, but the profits obtained, when not required for technical purposes, are added to the funds. The expenditures for 1910 amounted to $139,360 and the income for the same year was $149,276.

The technical and scientific advancement of the iron industry is effected in several ways. A staff of technical specialists is employed, who give advice to members and to the industry in general and make propositions in the iron industry and kindred trades. At present six engineers, one head engineer, and two ironmasters are employed. Three of the engineers specialize in metallurgy, one specializes in matters regarding charcoal and the dry distillation of wood, another makes a special study of peat-moss litter and of electricity in the iron industry, and another is employed chiefly for mechanical engineering.

Yearly grants are made by the Järnkontoret for experiments in the iron industry, to mining schools, and to technical laboratories at home and abroad. Geological researches and technical papers and periodicals are also supported and grants are voted toward the cost of representing the Swedish iron industry at exhibitions at home and abroad. The Järnkontoret granted $67,000 for the establishment at Trollhattan of the experimental works for electric iron-ore smelting.

By means of yearly stipends opportunities are offered to students leaving the mining schools to gain further experience, preferably practical, in the mining industry, and financial support is given to engineers possessing a thorough practical knowledge of the Swedish mining industry in order to enable them to obtain foreign experience. In recent years sums have also been voted toward the expenses of workmen traveling to gain experience, and sums are granted every year for the protection of Swedish iron brands abroad. Since 1817 the Järnkontoret has issued a periodical, Järnkontorets Annaler, which is one of the oldest metallurgical papers in existence.

German Patent Law Practice

An important change has been made in German patent law practice in regard to the obligation of patentees to work the inventions covered by their patents. Hitherto the owner of a German patent was liable to have his monopoly withdrawn if it could be proved against him that he had failed to take adequate steps to bring his invention into practice within three years of the publication of the grant. The law, however, was seldom rigidly interpreted, and it was usually considered sufficient if the patentee announced his willingness by advertisement or otherwise to grant licences on reasonable terms.

Under the law, which went into effect July 1, a German patent can no longer be revoked on the sole ground that it is not being worked, but only if the working is being effected either exclusively or principally outside the German Empire or its colonies. The new act is subject to existing international treaties, and the agreement made between Germany and the United States in 1909 exonerates American owners of German patents from working the same. It is, however, expressly stipulated that the owner of a German patent cannot escape his obligations by temporarily assigning his rights to a citizen of the United States for example. A fictitious transfer of the patent without an actual and bona fide assignment of the property rights will not save the patent from revocation.

Gary, Ind., was five years old July 14. On that date, in 1906, 43 voters organized a town government, with Thomas E. Knotts as president. He has been at the head of the municipal government ever since; of recent years as mayor. The only buildings in Gary at the time of the first election were a schoolhouse, a jail, a post-office, town hall and a cottage used by the United States Steel Corporation for offices. The residents lived in tents and shacks.

Electric Power Cost

A Year's Record for Generating Power at the Colliery Mouth

Average Yearly Cost Per Kw.-Hour, 0.877 Cent.

Plans are under consideration by several large industrial companies, in Pennsylvania and in a number of Western States, for the erection of central power distributing stations in the immediate vicinity of collieries, electric current from which will be transmitted to plants at a distance. The idea is to utilize fuel which is now virtually waste, as it will not pay for transportation.

As a practical illustration of what can be accomplished in the economical generation of electric power, the accompanying record of a year's run will be of interest. It was obtained from the engineer in charge.

Annual Operating Cost of Power Plant for Railroad Shops, with Situation Equivalent to Location at Colliery Mouth. All Items Reduced to Kw-Hour Basis.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Total, kw. hrs	271,110	239,827	221,710	177,135	177,910	172,025	195,691	208,561	183,252	176,392	198,835	250,065
Electric, kw. hrs	178,410	143,755	125,060	90,885	84,835	82,325	83,980	90,100	85,850	90,440	96,455	140,965
Compressed air, kw. hrs	48,750	55,020	50,625	46,873	50,550	48,750	68,436	75,936	58,500	46,452	43,500	52,500
Hydraulic, kw. hrs	21,450	20,052	22,275	20,625	22,275	21,450	22,273	22,275	20,377	19,950	18,480	18,000
Hammer line, kw. hrs	19,500	18,000	20,250	18,750	20,250	19,500	21,000	20,250	18,525	17,550	22,400	18,600
Steam heat, kw. hrs	3,000	3,000	3,500	.....	.....	.....	.....	.....	.....	2,000	18,000	20,000
Coal consumed, tons	2,004	1,766	1,243.6	1,078.4	983.6	905.25	911.6	981.25	1,008.6	1,070.75	1,408	2,053
Coal per kw. hr., lbs	14.78	14.72	11.21	12.17	11.05	10.52	9.3	9.41	11.	12.14	14.16	16.41
Cost of coal, kw. hr	0.59c	0.58c.	0.448c.	0.487c.	0.442c.	0.4209c.	0.37c.	0.376c.	0.4403c	0.485c.	0.566c.	0.656c.
Cost of labor, kw. hr	0.2726	0.3069	0.3375	0.3886	0.3905	0.4033	0.3574	0.3043	0.3536	0.408	0.4028	0.321
Cost general supplies, kw. hr	0.0294	0.0331	0.0315	0.0394	0.0365	0.0377	0.0306	0.0287	0.0354	0.029	0.0352	0.0295
Total cost per kw. hr	0.8938	0.92	0.817	0.915	0.869	0.8619	0.758	0.709	0.8293	0.922	1.004	1.026

This record was made at a plant of 2000 hp. capacity operated in behalf of a leading railroad company which is, or has been, interested in coal mining; and the cost of the fuel at the mouth of the colliery was only 30 cents per ton, the cheapest grade of slack being utilized.

The plant cost $250,000 to build, and for fixed charges, including depreciation, 13 per cent. on this amount was figured, in addition to the operating cost shown by the table. The average yearly cost per kw.-hour was 0.877c.

The equipment in service was of the best, including return tubular boilers, chain grate stokers and cross-compound non-condensing engines. The load factor, however, was very poor, as the plant was designed for repair shop service, and a large part of the energy of the steam had to be diverted to air-compressor, hydraulic and steam hammer work, as well as heating in winter. Therefore, even with the good showing made, it compares unfavorably with what could be accomplished in the operation of a much larger plant, the service conditions of which have been worked out along the lines usual in modern central station practice. It would seem as though such plants might be made to pay as well as hydro-electric propositions, while giving the benefit of power at low cost to numerous metal-working establishments and other industries commonly located not far from the principal coal mines.

A Historic Kentucky Mill Dismantled

Probably the oldest ironworking plant in Kentucky has been dismantled after having been inactive for the past 30 years. It is a rolling mill located in Lyon County, about 10 miles from Eddyville on the Cumberland River. Built originally in 1846, it saw long service before the Civil War, and later was taken over and operated for a considerable period by the late Louis P. Ewald, of Louisville.

The Ewald Iron Company, which was organized following the death of Mr. Ewald, decided recently to dismantle the property because of the fact that the local tax officials wanted to assess it as an operating plant. During Mr. Ewald's life it was allowed to remain by him largely for sentimental reasons, as he discontinued its operation shortly after concentrating his work in Louisville.

The old mill had a peculiar location, but one which will be readily appreciated when the situation is considered. In the first place, since charcoal was used in its operations, it was necessary to be close to a large timber supply, and the fact that the plant stood for years in the center of a thickly wooded region emphasized this feature of the location. Raw material was also plentiful, as there were then and still are active charcoal blast furnaces in Trigg County, Kentucky. As far as the operating end of the business was concerned the location was good.

The river furnished the only mode of transportation. In equipping the plant originally, the machinery was floated down the Ohio River from Pittsburgh and then up the Cumberland in a vessel of lighter draft. In turn, the bars turned out by the mill were marketed by means of the steamers which plied up and down the Cumberland. A fine harbor, formed by nature, was immediately at hand, a deep pool being formed between the island and the shore, and a double tramway was built to carry cars from the mill down to the boats.

In spite of the fact that time and the elements had had full sway and that no effort had been made to protect the equipment from their attacks, a few pieces of machinery were discovered in the work of dismantling which could be used, and these may be installed in the plant of the Ewald Iron Company, in Louisville. Though the mill was built 65 years ago, the equipment was largely such as one would find in a rolling mill today, with the exception that the specialized machines which are in use now had not been constructed then. The mill represented what might be called the primary type of rolling mill, and was an excellent example of it.

The equipment consisted of 6 single puddling furnaces, 12 knobbling fires, 6 heating furnaces, 3 trains of rolls and 1 hammer, the capacity of the plant being 3600 gross tons per annum. Before Mr. Ewald took the plant over it was known as the Tennessee Rolling Works. Later it was usually referred to simply as the Ewald plant.

While in active operation, the mill produced a large amount of railroad material, and it was said that Mr. Ewald made his greatest success in the manufacture of this product. During the time that he operated the Louisville mill he specialized in bars for use in locomotive building and other railroad construction.

Most of the material in the old mill was broken up before being loaded into a barge and floated down the Cumberland River to the Ohio. Altogether there is about 500 tons. Practically all of it, with the exception of the few pieces which were taken out whole, will be sold in the Louisville market for scrap, thus removing the last vestige of what was a fine example of the iron plant of antebellum days.

A New Iron and Steel Jobbing House in Cleveland.—A new jobbing concern has been formed in Cleveland, Ohio, under the name of the Betz-Pierce Company. The company is an Ohio corporation with a paid up capital stock of $40,000, and has established a warehouse and office at 2234 to 2240 East Ninth street. It will sell the crucible and high-grade open-hearth steels of the Colonial Steel Company, Pittsburgh; cold-rolled strip steel, high-grade sheets, Jones & Laughlin screw stock and shafting, wrought iron pipe made by the Reading Iron Company, Norway iron, Menaca polished drill rods and other products. Arthur B. Betz is president; Clifford E. Pierce, vice-president; T. L. Philpott, secretary and treasurer. The officers and J. B. Finley of Pittsburgh and James A. Farrell of Cleveland comprise the board of directors. This company was organized as a result of the selling out of the Bassett-Presley Company to the Carnegie Steel Company. Mr. Betz had been connected with the Bassett-Pressley Company 20 years, the greater portion of that time representing the company as city salesman. Mr. Pierce had been with the same company 15 years, the greater portion of that time being assistant sales manager.

Otis & Squires, the Pacific coast agents of the Cutler-Hammer Mfg. Company, Milwaukee, Wis., have established a branch office in Portland, Ore. This office, which is in charge of G. L. Priest, is located at 220 Sherlock Building.

Welds by Different Methods

A paper on iron and steel welds made in various ways, compiling an extended series of microphotographs of sections through the welds, was contributed to the Iron and Steel Institute meeting some weeks ago in London by Edward F. Law, William H. Merrett and W. Pollard Digby. Studies were made of resistance welds, hot-flame welds with acetylene and water-gas and thermit welds.

Resistance Welds

The authors' investigation of resistance welds in steel commenced with some 1½-in. round bars and some 2½ x 2-in. rectangular bars, which had been welded together with plain butt joints. The welds generally may not be regarded as perfect from the point of view of fusion, but as showing traces of oxidation along the track of the weld. Two examples of resistance welds of wrought iron may be cited as typical of average practice. On etching, these showed in each case a line of oxidation at the point of juncture with large crystallization in the neighborhood of the weld.

Welds with Acetylene and Water Gas

With examples of acetylene welding the average tensile strength was 24.14 tons and the average elastic limits 17.01 tons, both fairly good. On the other hand, the low elongation and percentage reduction of area which accompany the crystalline fracture of two of the results indicate that in addition to working some further heat treatment was requisite. The authors would regard this process as a good filling method say for cavities in castings, but could not recommend it seriously for cases where mechanical strength is of prime importance.

The average tensile strengths and elastic limits of 21.47 tons and 14.69 tons respectively obtained with water-gas flame welds are lower than the results for plain butt-welded joints with acetylene-flame heating. On the other hand, whereas two of the four acetylene welds broke at the weld, only one of the four water-gas welds broke there. The elongation is much better, averaging 16.64 per cent., and the reduction of area at point of fracture is decidedly good.

For a long time certain consulting engineers have rigidly set their faces against the employment of welded flanges on steam pipes, preferring instead screwed and riveted flanges. Two cases (one a coke fire and the other an arc weld) coming before the authors, serve both to confirm and to illustrate the underlying soundness of this view. A welded pipe flange may be obviously mechanically imperfect, or may be superficially perfect and capable of passing hydraulic pressure tests. In this latter condition ignorance as to its internal condition produces a peace of mind which knowledge is liable to destroy.

Conclusion

No matter what the process is by which two metals are welded together, there must always be an area, more or less sharply defined, of altered molecular construction. Just as quenching and annealing alter steel in a manner which is quite unmistakable to those acquainted with the microstructure of steel, so it is obvious that the local heating to the high temperatures required for mechanically satisfactory welds leaves its impress upon the steel in a manner as unmistakable as the sodium band in the spectrum. The authors have shown that each of the methods to which they have referred has its own hallmark. For instance, on polishing and etching alone it is possible to say whether an electric weld has been made by an arc or by a resistance method; while, without annealing to restore the original structure, acetylene and water-gas welds have each their own marked characteristics.

Resistance welds are seemingly least prone (with the exception, perhaps, of acetylene welds) to oxidation, but the extrusion of the metal renders good working, while the metal is still plastic, of supreme importance. Arc welds are most prone to oxidation, and many will hesitate to rely upon such a process in those positions where corrosion is likely to occur. Where the welded metal is not likely to be subjected to corrosion the excellent fusion of the metal renders it commendable.

Flame welds, apart from such work as patching up castings, should receive adequate working and manipulation while in their heated condition. Of the two methods investigated, water-gas welds may be abnormal through the use of oxidizing flames, while acetylene welds certainly require annealing to break down the crystalline structure in the vicinity of the weld.

Old Copper and Brass Specifications

The following specifications for old copper and brass have been furnished by one of the most prominent dealers in old metals in New York City:

Copper, Heavy, Cut and Crucible.—This shall consist of any copper not less than 1/16 in. thick, free from foreign substances, except that a small percentage may have solder marks on it, but no lumps of solder, and shall be cut up in pieces about 5 in. wide and 10 in. long. This shall be the maximum size. If cut up in small pieces it will be considered crucible copper. This description applies also to uncrucible heavy copper, except as to its being cut up in pieces.

Copper Wire.—It shall be free from all insulation and from hair wire; also from other metals, such as brass and solder, and from other foreign substances.

Light Copper and Bottoms.—These shall consist of the bottoms of tea kettles, wash boilers, and hot water boilers.

Heavy Brass.—This material shall consist of any solid pieces of brass small enough to go into a 6-in. opening. The approximate mixture of this is 65 per cent. copper and 35 per cent. spelter. This, of course, varies; sometimes copper is a little lower, but it is usually higher. It shall be free from iron and other foreign substances.

Light Brass.—It shall consist of material like lamp tops, and may have a small percentage of iron that is not easily removed. It may also have some traces of solder on it, but not very much.

Heavy Machine Composition.—This is sometimes called red brass, and shall consist of metal that contains a greater or less percentage of tin, and is usually about 80 per cent. copper with a small percentage, sometimes, of lead and zinc. The best grade of composition is composed of copper, tin and a small percentage of spelter, but it is still composition if it has a larger percentage of spelter and a small percentage of lead. But it must always contain not less than 5 or 6 per cent. of tin; the smaller the percentage of tin, the less valuable it is. It is marketable in any form, but has greater value if in pieces that are small enough to go into a 6-in. opening. Steam valves and similar articles, also engine bearings, come under the head of composition.

The automobile testing laboratory forming a conspicuous part of the clubhouse of the Automobile Club of America, on Fifty fourth street, near Broadway, New York City, has been made the subject of a generously illustrated pamphlet of 32 pages which can, doubtless, be had for the asking on the part of those interested in having tests made of automobile appliances or suggestions given regarding new equipment. The work of testing is in charge of a technical committee and apparatus is available for all interested in making scientific investigations of complete power units, carburetors, ignition devices and transmission devices. The pamphlet gives a very good idea of the dynamometer for determining the power of the automobile engine. Both certified and non-certified tests are made, and the pamphlet gives the rules in this connection.

The American membership in the International Association for Testing Materials, as compiled for the meeting of the council held in Munich, Germany, March 18, numbers 465 out of a total of 2598, with Germany next in numerical strength with 399, and Russia, Austria, France, Denmark and Great Britain in the order named, with membership of 293, 220, 198, 170 and 140 respectively.

Papers for the testing materials congress to be held in the United States during the first half of September, 1912, in Washington and New York, are announced already in a few instances in the proceedings of the International Association for Testing Materials. They include one on the methods of testing cast iron by Dr. Richard Moldenke; one on hardness tests by Dr. Bradley Stoughton, and one on fireproof structures by Ira H. Woolson, New York.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET.

Liability for Injury to Employee Caused by Defective Maul.—While an employer must use reasonable care to provide suitable tools for his workmen and renew them when they become defective, an employer who furnished a competent machinist to recast new mauls when workmen called for them, and who furnished proper material for making the mauls, discharged his duty to the men and is not liable for injury to one workman caused by a particle flying from a maul used by another. (Massachusetts Supreme Judicial Court, Cunningham vs. Blake & Knowles Steam Pump Works, 94 Northeastern Reporter 450.)

Risks of Injury Assumed by Workman.—A pipe cutter and fitter assumed the risks of injury ordinarily arising in such employment, but he did not assume risks of the more hazardous employment of repairing an elevator, they being unknown to him. (Nebraska Supreme Court, Van Horn vs. Cooper & Cole Brothers, 130 Northwestern Reporter 567.)

Liability for Injury to Employee in Unloading Boiler.—An employer is liable for injury to an employee caused by a boiler rolling upon him while he was assisting in unloading it if the employer knew or ought to have known that the method of unloading adopted was dangerous and the employee did not have such knowledge or equal means of acquiring it. (Kentucky Court of Appeals, See vs. Leidecker, 135 Southwestern Reporter 284.)

Right to Rely on Employer's Assurance of Safety.—An employer's assurance to an employee that an appliance is safe does not preclude the former from afterward claiming that the latter assumed the risk of being injured through a defect in the appliance, if the risk was actually known and comprehended by the employee. (Pennsylvania Supreme Court, Herron vs. American Steel & Wire Company, 79 Atlantic Reporter 228.)

Employee's Violation of Rules as Contributory Negligence—Duty to Warn Inexperienced Employees.—An employee cannot recover for injury resulting from his violation of a known and reasonable rule prescribed for his protection. An employer's duty to warn his workmen against dangers incident to their employment is stricter where the workman is a minor than when he is an adult, depending upon the age, experience and intelligence of the particular employee. (Alabama Supreme Court, Lewis vs. Woodward Iron Company, 54 Southern Reporter 566.)

Termination of Employment Contract.—An employee cannot be held liable as for breach of his contract of employment by quitting, if no definite term of employment has been agreed upon. (New York Supreme Court, First Appellate Division, Murphy vs. Lindstedt, 127 New York Supplement 609.)

Assumption of Risks by Laborers.—A common laborer engaged in hazardous employment assumes the risk of injury arising from the nature of his work. (Georgia Court of Appeals, Johnson vs. Alabama & Georgia Iron Company, 70 Southeastern Reporter 156.)

Liability for Injury Caused by Leaving Elevator Door Open.—An employer is not liable for injury to an employee caused by a pipe rolling through a door into an elevator shaft left partly open by another employee. (New York Supreme Court, Second Appellate Division, Deebach vs. Robert Gair Company, 127 New York Supplement 984.)

Liability for Injury Caused by Defective Tools.—An employer is not liable for injury to a workman caused by a defective tool, if it is of simple construction and was safe when placed in the latter's hands or in the hands of a fellow employee, unless the employer had actual knowledge of the defect. There is no duty resting on an employer to inspect such tools while they are in the workman's possession. A workman cannot complain of his employer's failure to inspect a tool if he negligently uses a defective tool when a safe one is at hand. (Indiana Appellate Court, Nachand vs. American Car & Foundry Company, 93 Northeastern Reporter 1083.)

Negligence of Injured Workmen.—"Due care," within the provision of a Massachusetts statute that an employee can recover for personal injury caused by certain defective conditions, if he was exercising due care, means that degree of care which an ordinarily prudent man would use in the same circumstances. It cannot be said as a matter of law that an operator of a casting-cleaning machine was guilty of contributory negligence, barring recovery for injury received by him, because he placed a stick between the cogs of two wheels to stop the machine, where he did it at the direction of his superintendent after an unsuccessful effort had been made to make the friction clutch work. (Massachusetts Supreme Judicial Court, Curren vs. Magee Furnace Company, 94 Northeastern Reporter 399.)

When No Implied Warranty Arises Under a Contract of Sale.—Notwithstanding the fact that the seller of an article knows it is bought for a particular purpose there is no implied warranty by him of its fitness for that purpose, if the buyer has inspected the article and procured what he contracted for. (West Virginia Supreme Court of Appeals, Erie City Iron Works vs. Miller Supply Company, 70 Southeastern Reporter 125.)

Place of Delivery of Articles Sold.—If a contract for a sale of articles did not provide where they were to be delivered, and the seller offered to deliver them at the buyer's place of business, and the buyer declined that offer the seller was not bound to actually carry the articles there. (Georgia Court of Appeals, W. M. Scott & Co. vs. Atlanta Wood & Iron Novelty Works, 70 Southeastern Reporter 142.)

Failure to Inspect Supporting Rope as Negligence.—That a rope used to support one corner of a platform upon which an employee was required to stand had not been inspected for a year warranted a finding of negligence of the employer in a suit for injury to the employee, caused by the rope breaking. (United States Circuit Court of Appeals, Third Circuit; American Steel & Wire Company vs. Tynan; 183 Federal Reporter 949.)

Necessity for Instructing Workmen Concerning Dangers.—It is actionable negligence to set a blacksmith at work heating a hollow piston head without instructing him to make a vent therein to permit escape of steam which is likely to be generated in the interior and otherwise cause an explosion. (United States Circuit Court of Appeals, Second Circuit; Klauder-Weldon Dyeing Machine Company vs. Gagnon, 183 Federal Reporter 962.)

Excessiveness of Recovery for Injury to Employee.—The sum of $7,000 is not excessive recovery for injury to an employee injured in an explosion, where he was badly burned and disfigured, his suffering was prolonged, his hand permanently disabled and his earning power reduced from $100 a month to laborer's wages. (Washington Supreme Court; Mrozevich vs. Western Steel Corporation, 112 Pacific Reporter 925.)

Employer's Duty to Workmen.—One is not an insurer of the safety of his employees, being merely bound to use due care for their safety. (New York Supreme Court, Appellate Term; Dean vs. Terry & Tench Company, 127 New York Supplement 305.)

Necessity for Notice of Injury to Employee.—The New York employers' liability act cannot be invoked by an employee suing for personal injury where no sufficient notice of the injury has been given. (New York Supreme Court, Second Appellate Division; Sullivan vs. Schweinler, 127 New York Supplement 290.)

Scope of Duty to Guard Dangerous Machinery.—The New York statute which requires dangerous machinery to be guarded requires guards against such dangers as ordinary prudence suggests, and is intended not only to protect the operators of such machinery but to guard all who are required to come near it. (New York Supreme Court, Kings County; Hartman vs. Berlin & Jones Envelope Company, 127 New York Supplement 187.)

Sufficiency of Proof of Shipment of Articles Sold.—Where the buyer of articles shipped to him defends suit for part of the price, on the ground that some of the articles were not shipped, the seller should show otherwise than by the bill of lading, that all of the articles were delivered to the carrier, where the bill of lading makes no further reference to the character or identity of the articles than the approximate weight of the shipment as a whole. (Georgia Court of Appeals, Edward K. Tryon Company vs. Hutchinson Lumber & Supply Company, 70 Southeastern Reporter 87.)

Rights in Dealing with Agents.—Persons dealing with a general agent are entitled to assume that his authority to deal with them continues until notice of revocation of the authority is given expressly or impliedly. (Georgia Court of Appeals, Bazemoore vs. A. B. Small Company, 70 Southeastern Reporter 261.)

Necessity for Compliance with Foreign Corporations Act.—It is immaterial that a foreign corporation suing in Pennsylvania on a contract made and to be performed in another State has not complied with the Pennsylvania foreign corporations act. (United States Circuit Court, Eastern District of Pennsylvania, Sloss-Sheffield Steel & Iron Company vs. Tacony Iron Company, 183 Federal Reporter 645.)

The Iron and Steel Institute's Turin Meeting

For the autumn meeting of the Iron and Steel Institute at Turin, Italy, October 2 and 3, 1911, the provisional list of papers expected to be submitted for reading is as follows:

"Report on the Mineral Resources of Italy." By various authors.
"The Autogenous Welding of Metals." By Dr. Francesco Carnevali, Turin.
"The Application of Electrical Energy to the Manufacture of Iron and Steel in Italy." By Cav. Ing. Remo Catani.
"The Present State of the Iron and Steel Industries of Italy." By Signor Comm. Luigi Dompé and Cav. Francesco Saverio Pucci.
"New Industrial Processes for the Cementation of Steel." By Cav. Prof. Dr. Federico Giolitti.
"Cementation with Gas under Pressure." By Prof. Dr. F. Giolitti and Dr. Francesco Carnevali.
"The Transformation of Steel within the Limits of Temperature Employed for Heat Treatment." By Louis Grenet, Argenteuil, France.
"Basic Slag." By V. Adolphe Kroll, Jr., Frankfort-am-Main.
"The Use of Titanium in Iron and Steel." By C. V. Slocum, Pittsburgh.
"The Physico-Chemical Properties of Slags." By Prof. J. H. L. Vogt, Christiania.

The programme for the morning of October 2 provides for a welcome to the members by the civic authorities of Turin, the Chamber of Commerce, the Local Reception Committee, and the Reception Committee of the Associazione fra gli Industriali Metallurgici Italiani, in the Grand Hall of the Chamber of Commerce. After the reception, the Carnegie gold medal for research (1910) will be presented to M. Felix Robin, of Paris, and a selection of papers will be read and discussed. The afternoon will be passed in a visit to the Exposition. In the evening a reception will be held by the Chamber of Commerce at the Exchange, 28 Via Ospedale.

The morning of the next day will be devoted to the reading and discussion of papers; the afternoon to visits to places of interest in Turin and to the Fabbrica Italiana di Automobili di Torino (F.I.A.T. Company, Ltd.), and the evening to a reception by the Municipal Corporation of Turin.

A tour in Italy has been arranged, which includes visits to plants as follows: Savona, by invitation of the Societa Siderurgica di Savona; Naples, the Ilva Company (blast furnaces and steel works); Terni, Societa degli Alti Forni, Fonderie ed Acciaierie di Terni. A special excursion will be made to the Island of Elba to visit the iron mines, October 6 and 7.

Steel Derricks and Drilling Rigs

A booklet entitled "Steel Derricks and Drilling Rigs for Oil, Gas, Salt and Other Wells, Mineral Exploration Work, etc.," is published in its third edition by the Carnegie Steel Company, Pittsburgh, Pa. It is the last word on the subject, which is handled in so comprehensive a manner that the contents must possess great value to those who are interested in this class of equipment. The derricks described are of structural steel and have as the principal improvement the reduction of the hight of the panels to permit erection without any special equipment in the way of scaffolding, together with the reproduction in steel, as far as possible, of the identical features in wooden construction which have been approved by long years of use.

Three types of derrick are illustrated and described—the Woodworth Standard, the Woodworth Oklahoma and the Yorke Standard—each of which has its respective advantages. They are alike in the use of structural steel angles for the legs, in the arrangement of crown blocks and the make-up of ladders. The Woodworth Standard and the Yorke Standard have diagonal bracing of structural steel angles, while in the Woodworth Oklahoma this bracing is made of round rods. The Woodworth derricks are put together with bolts which must be put in and taken out in the process of erection and removal, whereas in the Yorke Standard the bolts are simply loosened and remain in place. The volume goes into minute details of the construction of the several types with full specifications for the complete drilling rig, including line drawings, which should make easy the installation of the apparatus in the field.

The Carnegie Steel Company last week blew in two additional blast furnaces at its Ohio works, Youngstown, Ohio, which gives it five active furnaces out of six stacks in that group.

Softening Water on a Large Scale

A cheap and effective means of softening hard water has recently come into use in Germany on a large scale, according to the Engineer. The peculiar property of zeolites—which are generally composed of varying quantities of silica, alumina, lime, soda, potash and water—whereby they can exchange their bases for others, enables them to be utilized as softening agents, and when hard water filters slowly through layers of them the lime in the water changes place with the soda in the zeolites.

In Germany there is now being produced an artificial zeolite of a uniform composition, the action of which on water is more certain. Permutit, as this substance is called, is prepared by fusing together feldspar, kaolin, clay and soda in fixed proportions, lixiviating the product in hot water and collecting the residue. In use as a softener a period must arrive when all the soda in it has been given up and when, of course, its action ceases. It can then be easily regenerated with common salt simply by washing it thoroughly with soft water and allowing a salt solution of 10 per cent. strength to flow through it for four or five hours; the layer of brine is then kept standing on the surface for another four or five hours. In the regeneration process the soda of the sodium chloride replaces the lime in the permutit and becomes converted into calcium chloride, which passes away in solution in the regeneration water.

Permutit, it is said, is capable of reducing hardness from 53 deg. to 3.7 deg. It suffers no apparent loss in working and can be kept in use for very long periods with regeneration every four days or so. In appearance, when in a moist condition, it is of a granular, flaky form with a luster resembling mother-of-pearl. It is of very porous texture and when dry can absorb 50 per cent. of water.

The Peterson Engineering Company, New York and Chicago, has taken over the exclusive sale of the Imperial elevator guide lubricant from the American Engineering & Mfg. Company, Philadelphia, Pa., its former manufacturer. This device will be known in the future as the Economy elevator guide lubricator and it is claimed that recent improvements in it enable an economy of from 10 to 15 per cent. to be effected in the power consumed by the elevators due to thorough lubrication of the guides. Other advantages claimed are reduction in fire hazard, increased lifting capacity of the elevator, a marked reduction in the oil and grease consumed and the elimination of the danger to life and limb necessitated by the old method of hand swabbing the guides from the top of the car.

The Armor Steel Foundry Company, Winton Place, Cincinnati, successor to the Steel Foundry Company of the same place, and the Armor Steel Foundry Company of Matthews, Ind., announces that it has about completed all contemplated alterations and additions to the plant. Among the additions is the installation of a side-blow converter and cupola, which will better enable small casting to be made for automobile and tool manufactures. The company is prepared to make castings up to 10 tons, either of basic or acid open-hearth or converter steel. Its staff of mechanics and metallurgists of high standing is competent to make steel castings of any desired alloy (manganese, chrome, titanium or nickel) or by the Gebhard process of surface hardening, which is its specialty.

The W. A. Rowe Vehicle & Machinery Company, 1105 Garrison street, Fort Smith, Ark., has been incorporated to carry on a wholesale and retail machinery and vehicle business and to act as a manufacturers' agent along these lines. The company is especially interested in gasoline engines, small milling machinery, well drills and vehicles. It reports that conditions in its territory for corn are for half a crop, but that cotton never looked better and recent rains cause everyone to look for a good fall business.

A. P. Munning and W. L. Loeb announce the establishment of the Munning-Loeb Company, with main offices and works at Matapan, N. J., for the manufacture and design of electroplating and buffing equipment and supplies. The products include anodes, brushes, buffs, chemicals, compositions, dynamos, lathes, nickel salts, rouges and tanks.

The Oil Pump House at Gary

As in all other departments of the Gary plant of the Indiana Steel Company, completeness of detail and provision for greatest economy have been incorporated in the oil pump house. This minor portion of the plant, though insignificant in a way, is none the less interesting. The accompanying illustration presents a view of the interior. The proper storage of oil involves provision for at least three essential features as embodied in this installation: 1. The retention of the original strength and purity of the oil. 2. The prevention of contamination with foreign substances, particularly with regard to lubricating oils. 3. The elimination of waste in measuring, loss of time in handling and the convenience of location. The second point is especially important with reference to the carbonizing of oil in bearings, the absence of which contributes materially to free-running bearings.

The equipment consists of 21 tanks, with a combined capacity of 127,000 gal., including eight tanks of 15,000 gal. each, 12 tanks of 5000-gal. capacity each, and one 1000-gal. tank for gasoline. To these tanks are attached 21 standard long distance self-measuring hand pumps and eight power pumps. The hand pumps serve for drawing oils, which rate can be increased for the lighter oils in proportion to their viscosity.

The eight large tanks are built of 5/16-in. soft tank steel and the smaller tanks of ¼-in. steel for the shells and 5/16 in. for the heads. Eighteen tanks are located in a concrete vault, a part of which serves as a foundation for the pump house. The remaining three tanks, including that for gasoline, are buried outside underground near the oil house. The underground tanks are filled through a "fill pipe," extending to the surface of the ground and terminating in a lock cap, so that the filling and venting of these tanks are done outside of the oil house. The large tanks in the concrete vault are filled from the pump house floor. The fill pipes are protected by a special metal fill box which is flush with the floor, thus permitting free traffic over the floor without injury to the pipes.

The system is so arranged that the oil can be emptied directly from tank cars into the storage tanks, which avoids handling and minimizes the hazards attendant thereto. The apparatus also provides a self-registering and accurate check on the receipt and consumption of the various oils, each pump being equipped with registering devices which record continuously the amount of oil

Installation of Bowser Oil Pumps in the Gary Works of the Indiana Steel Company.

oil or gasoline for use in the immediate vicinity of the pump house. The measuring device enables the operator to draw any predetermined quantity very accurately and without waste.

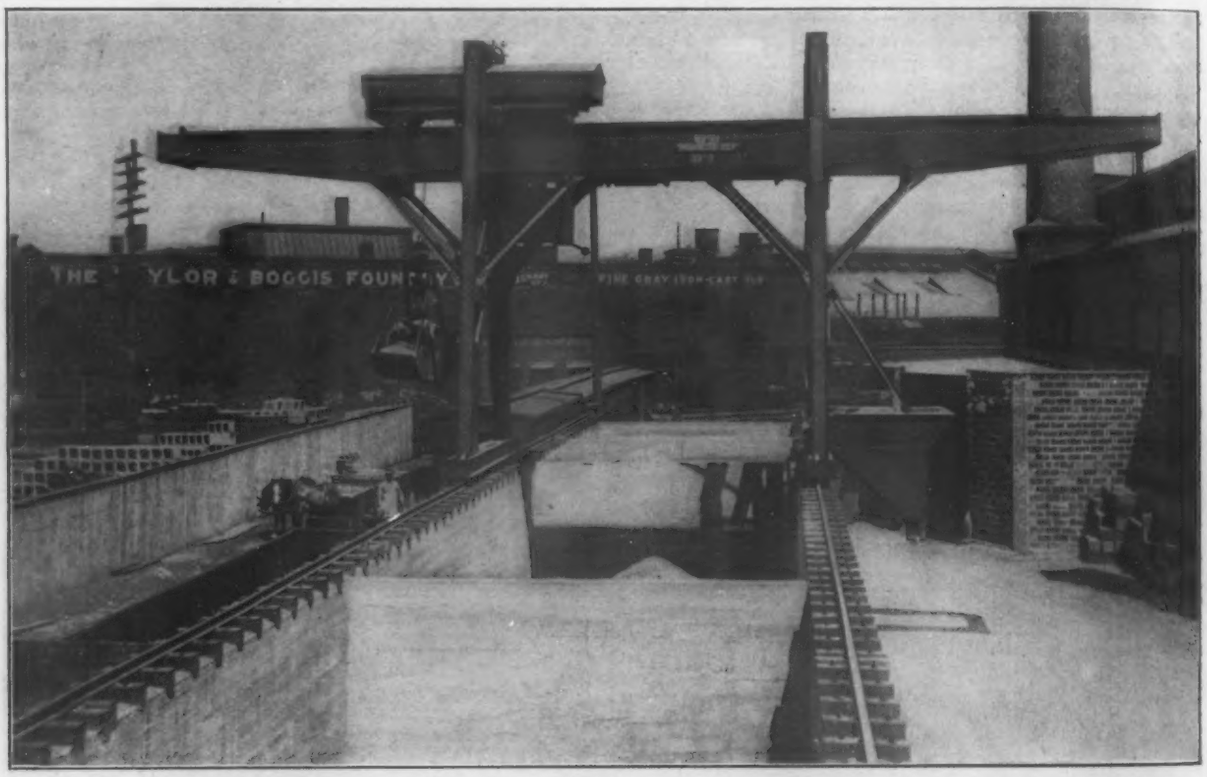
The power pumps are fitted with a pulley and are driven from a line shaft, which in turn is motor driven. These pumps are used for filling large containers or drawing oil in large quantities for whatever purpose desired. They are equipped with an arrangement which automatically registers any predetermined quantity for which they are set, and when that quantity is drawn the pump is immediately thrown out of gear. The indicator plate by which the operator sets the pump for the quantity of oil desired is placed on the front of the pump and will register up to 100,000 gal. These pumps will discharge an average of 10 gal. a minute of the heaviest drawn. The hand-pumps are fitted with locking devices so that the one in charge of the pump house can control the entire supply and be held responsible therefor. This installation was furnished complete by S. F. Bowser & Co., Inc., Fort Wayne, Ind., and handles 18 kinds of oil for the various requirements of the steel plant.

The Federal Grand Jury, New York, which investigated the American Smelting & Refining Company, has decided that the evidence was insufficient to sustain the charge of violating either the anti-trust or the interstate commerce laws. United States District Attorney Wise is reported as saying that the investigation has been closed and that the matter presented by order of Attorney General Wickersham has been dismissed by the grand jury.

Economical Sand and Stone Handling

What is said to be one of the fastest and most economical plants for handling stone, sand and gravel is located at the Wilson avenue yards of the Cleveland Builders' Supply Company, Cleveland, Ohio. This plant which was built and installed by the Cleveland Crane & Engineering Company, Wickliffe, Ohio, handles the material between the car and the storage bins or wagons or from the bins to the wagons with great speed and at very low cost.

The reason for installing this plant was that frequently contractors would demand immediate delivery of orders which might include six or eight wagon loads of stone or sand, a condition that it was almost impossible to meet with hand loading. The installation is of interest,



A Grab Bucket and Cantilever Gantry Crane for Handling Sand Installed by the Cleveland Crane & Engineering Company, Wickliffe, Ohio.

therefore, because of its practicability. The essential part is a large reinforced concrete bin, measuring approximately 120 ft. in length, 30 ft. in width and about 15 ft. deep, divided into four compartments for assorting two grades of crushed rock and two grades of sand. On top of the two side walls of the bin are laid rails on which an electric 3-ton gantry crane equipped with a main trolley and a clamshell bucket travels. At each end of the gantry there is a cantilever, one projecting out over the cars on one side, while that at the opposite end projects over a hopper for loading the wagons, as shown at the right of the engraving. This hopper has a capacity of 3 cu. yd. and is attached to the gantry so that it is posible to load a wagon at any point along the side of the bin.

The savings effected by the installation are not alone in its ability to handle the stone and sand cheaply, but also to do it quickly, it being possible with this outfit to load six or eight wagons in less than 30 min. This enables the wagons to be released very soon after their arrival at the yard and it is possible for the same number of wagons to do a much larger amount of work, which, of course, cuts down the investment in horses, wagons and drivers, and results in handling the material at a lower cost. Previously the labor cost of unloading material from the car to the storage pile alone averaged $6 per car and the service was poor and somewhat irregular. With the crane equipment it is possible to unload six to eight cars per day without any difficulty and the services of only two men are required, one to operate the crane and the other to assist in filling the buckets when the cars are being unloaded. In most cases this material is handled twice, since it is first deposited in the bins, and then taken from them and loaded on the wagons.

The Steel Castings Trade at Chester, Pa.

Considerable irregularity is reported in trade conditions by steel casting manufacturers in the Chester, Pa., district, and the situation is on the whole unsatisfactory. Crucible steel casting makers are the exception, their plants running full time. The majority of the open-hearth plants have for some months not been exceeding 50 per cent. of their capacity, and, in a number of instances, have for some time been working nearer to one-third their normal rate. There is an absence of demand covering any large amount of castings, which would serve as a back log. Railroad work comes out only spasmodically. The foundries are therefore dependent, to a large extent, on the current demand, with the result that week to week operations frequently show quite a wide variation. As most of them are seeking business aggressively, competition is keen and prices suffer. Future conditions depend greatly on the railroad demand and, as there is not a great deal of business of this class being offered, the outlook for any marked betterment in the immediate future is not particularly promising.

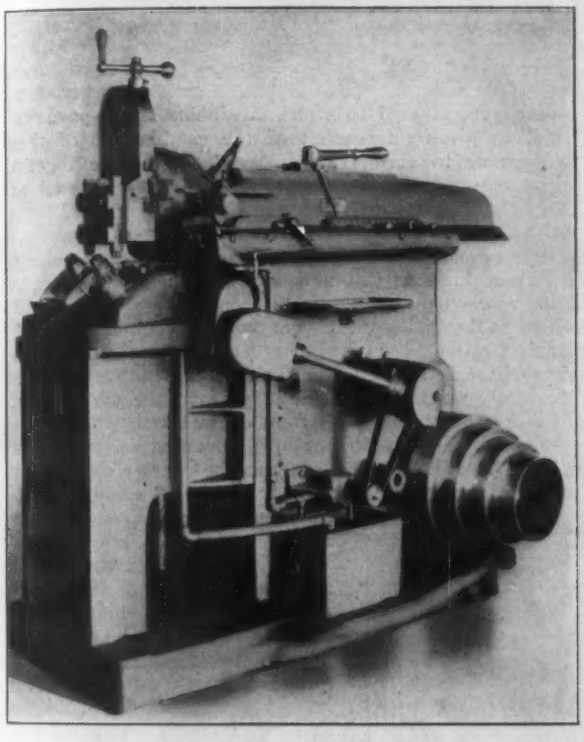
Correction.—The Foote-Burt Company, Cleveland, Ohio, corrects an error which was made in preparing the table in the article that appeared on page 163 of *The Iron Age* of July 20. The peripheral speed in feet per minute of the first item on the list, the 1¼-in. drill in cast iron, should be 188 ft. per minute instead of 163.6 ft.

The Coal Trade Bulletin, Pittsburgh, in its issue of July 1, published an interesting article on the School of Mines of the University of Pittsburgh. This institution is stated to be doing splendid work through the tireless efforts of Dr. M. E. Wadsworth, its dean, in developing technically trained young men for important responsibilities in mining. The school was established in 1895, and has become a potent factor in the development of the coal mining interests of western Pennsylvania. The summer term opened June 26 with a large attendance.

The Pittsburgh & Lake Erie Railroad Company, Pittsburgh, has broken ground for the erection of a car repair shop on Davis Island, near that city. Contracts placed call for a wood-working shop and stock house, 65 x 250 ft.; a paint shop, 30 x 70 ft., and smaller buildings. They are expected to be ready for operation the latter part of September.

Gould & Eberhardt Bevel Gear Roughing Shaper

In the manufacture of bevel gears there are two operations which are known as the roughing or stocking out and the finishing. The former consumes the greater part of the time required to complete the gear and if this operation is performed on the bevel gear planer, which is an expensive machine, the cost of the gear is very high. it is therefore apparent that the more economical way of making these gears is to rough them out on a roughing shaper and finish them in the regular way. This method would in no way impair the accuracy of the expensive finishing planer especially as the machine is relieved of the hard strains to which it is subjected in stocking out a gear. To enable this method of procedure to be



A 24-in. Shaper with Bevel Gear Roughing Attachment Built by Gould & Eberhardt, Newark, N. J.

followed, Gould & Eberhardt, Newark, N. J., have developed a bevel gear roughing shaper upon which patents are pending. This machine is designed to perform the roughing operation only and is especially adapted for roughing out automobile differential steel bevel gears which cannot be done in the ordinary simple disk cutter type of machine because of the projecting hubs on the cone or small end. These hubs interfere with the rotary cutter and prevent it from cutting the entire face of the gear. This new shaper operates at a speed of 100 cutting strokes per minute and is therefore very well adapted to that class of work. This large number of cutting strokes is made possible by the double train gear drive which in the case of this particular machine has been modified so as to allow one or two gear blanks to be held rigidly at the proper angle and indexed at every return stroke of the ram while the shaper head is fed down automatically at each stroke until the proper depth is reached. At this time the feed is disengaged automatically and the blanks are removed.

In general the construction follows that of the builders' standard high duty shaper which was illustrated in *The Iron Age*, March 4, 1909, but the regular crosshead slide and the table have been removed and a special workhead with an indexing mechanism substituted. This head can be arranged to cut either one or two gears at a time and is provided with means for holding the blanks rigidly in position and removing and replacing them when finished with new ones as well as lubricating the tools. The machine shown in the accompanying illustration is roughing out two nickel steel bevel gears having 20 teeth of 5/7 pitch simultaneously, the time required to complete the operation being 6 min. These gears have projecting hubs and to remove the chips accumulating in the groove between the projecting hub and the inner face of the gears, two hook tools are provided which are kept in this groove by spring tension and can be easily thrown out of position without removing the gear.

The indexing of the blank from one tooth to the next consecutive one takes place at every return stroke of the ram while the tool is clear of the work. In this way the indexing operation is positively controlled by the reciprocating motion of the ram and when the indexing is completed the work spindles are securely locked before the tool re-engages the work, thus insuring that the blank will be rigidly held while the cut is being taken. As the ram returns and the tool is out of the cut, the automatic vertical feed to the head takes place. This feed operates until a small trip dog located on the side of the head and controlling the depth to which the tool will feed disengages it.

The weight of the machine is 4300 lb. and its equipment includes an automatic oil pump, a large oil reservoir and a foot brake which acts on the driving pulley and will stop the shaper instantly.

Experiments on 0.2 Per Cent. Vanadium Steel

The influence of 0.2 per cent. vanadium on steels of varying carbon content was made the subject of a paper read before the Iron and Steel Institute some weeks ago, by Andrew McWilliam, assistant professor of metallurgy, and Ernest J. Barnes, associate in metallurgy of the University of Sheffield, England. The paper took up the physical characteristics of the series of steels, a thermal analysis of them and their microstructure.

Experiments were made to determine the strength, elastic limit, elongation and reduction in area of the steels as received and the steels after treatment. Specimens were normalized, by which is meant that they were heated to 900 deg. C for 30 min. and colled in air, and they were also annealed, and also quenched in water and tempered at various temperatures.

The steels as received showed an erratic nature as regards the yield point and also an extraordinarily high yield point and maximum stress as compared with the normalized steels. The decrease in maximum stress by normalizing was accompanied by an increase in elongation.

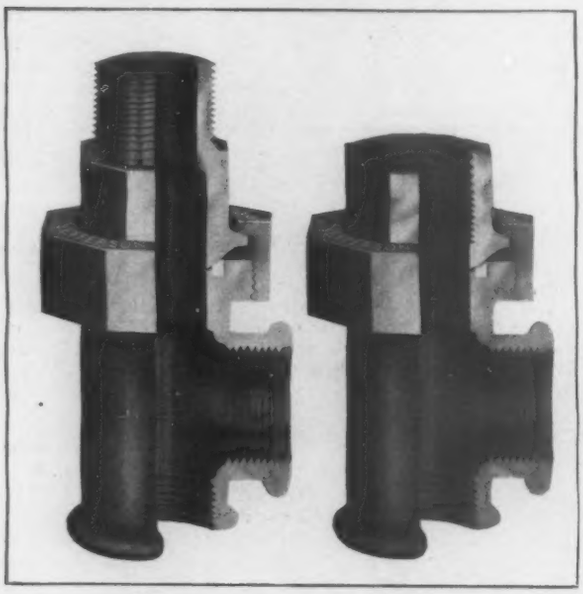
There is a general decrease noted in maximum stress in the steels with more than 0.98 per cent. carbon. With the specimens that were given heat treatment quenching in water and tempered at different temperatures, there was a regular increase in the yield point and maximum stress with increases in carbon up to the steel with 0.98 per cent. carbon.

The Atkinson-Frizelle Company is now the name of the old William H. Atkinson Company, the change having been approved by the stockholders and certified by the authorities of New Jersey on June 29. The following active officers constitute the present board of directors: Horace T. Frizelle, president; John Fuller, vice-president; William H. Atkinson, treasurer; Cleveland L. Frizelle, secretary; Charles L. Ballard, assistant treasurer. President Frizelle states that, notwithstanding the general relaxation of industrial activity, the business of the company for the past fiscal year shows an increase of over 50 per cent. The addition of new equipment and more scientific methods of production and systematic management have resulted in economies which warrant still further extensions of its facilities, which will be undertaken in due course. The company manufactures dredging machinery, buckets, forgings, structural steel and plate work, besides conducting a general machinist business and making marine repairs. The main office and works are in Hoboken, N. J., with a branch office at 50 Church street, New York.

The Brown Hoisting Machine Company, Cleveland, reports a good volume of orders in its locomotive crane department. This company has just received an order from the Algoma Steel Company, Sault Ste. Marie, for a bridge.

New Jefferson Union Tee

In addition to the regular union, the swinging union and the union elbows which were illustrated in *The Iron Age*, April 28 and September 1, 1910, and June 1, 1911,



Two New Types of Jefferson Union Tees Made by the Jefferson Union Company, Lexington, Mass.

respectively, the Jefferson Union Company, Lexington, Mass., is making a new fitting embodying the principles of its brass to iron seat and spherical ground joint. This new fitting is a tee which is made in two styles with either external or internal threads and with the union on either the outlet or the run and does away with three pipe joints and the accompanying expense.

The construction of this new fitting follows that of the other members of this line, malleable iron being employed for the body. The seat ring, which is of brass, is ground to make a ball joint, is seated in a channel cut in the iron and is set back out of the runway. Seamless tubing is used for this part, which is therefore free from the defects that it is claimed are frequently found in seats made from cast metal. The pipe ends are octagonal and Briggs standard taper pipe threads are used to insure tight joints. These threads are coated with graphite which prevents corrosion and renders it an easy matter to disconnect a fitting after long use.

Hydro-Pneumatic Radial Drill

A New Tool Possessing a Number of Special Features

The Walter H. Foster Company, 50 Church street, New York City, has recently placed on the market a new type of radial drill to which the name hydro-pneumatic has been given on account of the combination of these two means to feed the spindle. This feature together with the way in which power is applied to the tool are two special points about the drill and tend toward material economies both in operation and maintenance. As will be noticed from the engravings the principal point of difference between this new tool and the standard radial drills now on the market is the combination of the saddle which is located on the arm with a cylinder having a gearbox mounted on its upper end. Fig. 1 is a general view of the new tool, while Fig. 2 gives details of the head previously referred to and Fig. 3 shows the various positions of the valves for different operations.

The gearbox which is shown mounted on top of the cylinder in Figs. 1 and 2 contains the gears which furnish the necessary speed variation for the drill spindle in conjunction with an adjustable speed motor. Within this cylinder is an oil chamber which surrounds a second cylinder containing the spindle. A piston sliding in this cylinder is connected to the spindle that revolves within the piston and takes its thrust on ball bearings. The spindle drive is by an adjustable speed direct-current motor attached to the cylinder through a set of gears that provide two spindle speeds for each change in the speed of the motor which is shown at A, Fig. 2. The drum type controller B is of a new design with the resistance C for the various notches attached in a compact form and regulates the spindle rotation in either direction. When facing or tapping operations are being performed the movement of the spindle is controlled by a hand wheel. The high and the low speed gears in the gearbox which provide the spindle speed changes are controlled by a clutch operated by the lever D.

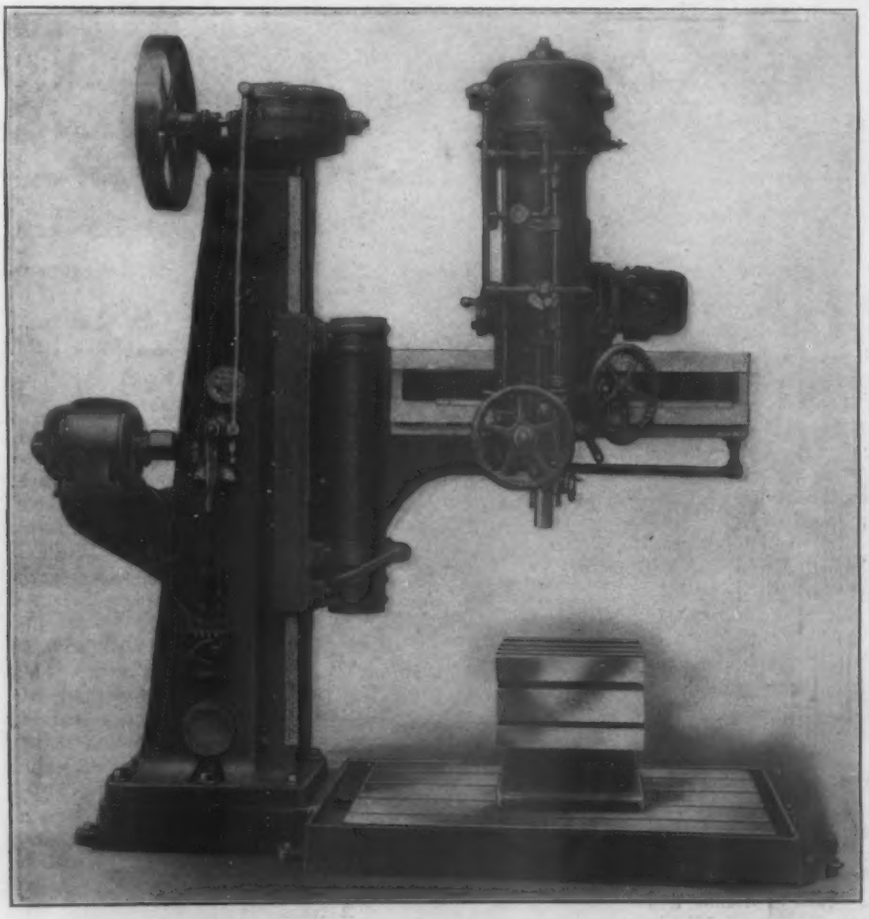


Fig. 1.—A Hydro-Pneumatic Radial Drill Built by the Walter H. Foster Company, New York City.

The feed is regulated by the valve E which has a graduated flat seat that regulates the passage of the oil from the cylinder to the surrounding oil chamber under an air pressure of 80 lb. This combination is said to give a steady feed to the spindle and also eliminates backlash with the consequent danger of the drill breaking when it strikes a hard spot or breaks through when a hole is completed. Whenever the resistance encountered by the drill point exceeds the pressure of the air upon the oil, the spindle merely revolves without feeding, thus insuring safety to the

drill at all times. As the air pressure on top of the piston in the cylinder forces the oil which is under the piston through the graduated ports in the valve seat the feed is constant at all times. A four-way valve, F, controls the passage of the air and determines whether the pressure shall be applied to the top of the piston which transmits this pressure to the oil that in turn is forced through the valve E and causes the spindle to be fed downward or whether the reverse operation shall take place and the air pressure be employed to force the oil back into the cylinder under the piston and raise the spindle. The air valve is operated by the vertical shaft G which carries adjustable trip dogs, HH. These dogs will swing out of the way when the spindle is operated by hand and not interfere with the tappet I which slides with the spindle as well as move out of the path of the stop without altering their position. An automatic device will shut off the air at any desired point and return the spindle to its original position.

The usual hand-operated rack and pinion which is controlled by the hand wheel M is provided for hand movement of the spindle. As the feed regulating valve is designed to confine the flow of the oil to a movement from the oil chamber to the space under the piston and vice versa, it became necessary to supply other communicating passages between these points that would not offer resistance to hand operation. A secondary oil valve of ample proportions which can be opened and closed at will together with an air by-pass having a valve at the top of the cylinder are provided for this purpose, the office of the latter being to open the cylinder and the chamber to the atmosphere. These valves which are indicated by J and K are controlled by the lever L through a connecting rod and permit the air and the oil to flow freely in either direction while the spindle is being operated by hand. The positions of these valves for different operations are shown in Fig. 3. When the spindle is to be operated by hand the air supply should first be shut off by turning the hand wheel M at the bottom of the spindle to save any waste of air. The four-way valve F is then closed and the by-pass valves J and K opened and the spindle can now be moved in either direction by hand. To change the control of the spindle from hand to automatic the valves J and K are closed and the four-way valve F opened. In making the changes from hand to automatic operation and vice versa it is not necessary to alter the position of the feed regulating valve except when it is desired to alter the rate of feed.

The adjustment of the head on the arm is controlled by the hand wheel N which rotates a spiral gear pinion

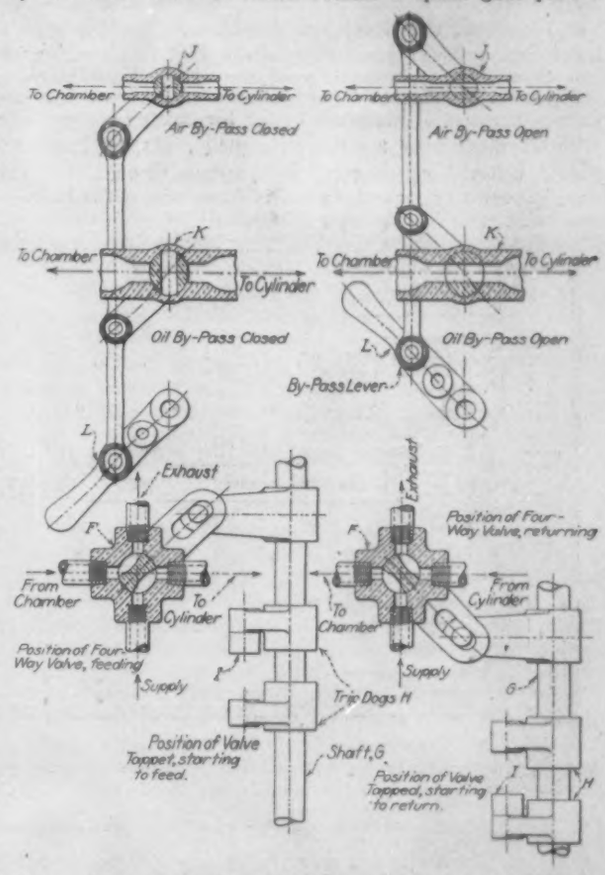


Fig. 3.—Diagram, Showing the Positions of the Valves for Different Operations.

that engages with a rack on the arm. A constant speed motor supplies the power required for raising and lowering the arm on the column but a tight and loose pulley can be substituted if desired. The oil pump which is bolted to the column is belt driven from the arm raising shaft.

Two sizes of drills having arms of 4 and 6 ft. respectively are built and the following table gives the principal dimensions and specifications of the two sizes:

	4 ft.	6 ft.
Will drill to center of, in.	111	161
Traverse of head on arm, in.	36	36
Maximum distance from trunnion to spindle, in.	48	72
Minimun distance from trunnion to spindle, in.	12	16
Distance between trunnion center and face of post, in.	7½	8¾
Vertical adjustment of saddle in.	36	42
Maximum distance from spindle nose to base, in.	62	78
Minimum distance from spindle nose to base, in.	12	33
Travel of spindle, in.	15	15
Spindle diameter, in.	2 9/16	3¼
Minimum spindle speed, r.p.m.	50	26
Maximum spindle speed, r.p.m.	400	350
Maximum feed per minute, in.	10	10
Morse taper of spindle.	No. 4	No. 5
Power required for driving spindle, hp.	3	5
Power required to raise and lower arm, hp.	1	2
Overall hight, in.	129	150
Maximum length, in.	113	164
Maximum width, in.	42	48
Working surface, in.	36½x56½	42x83
Depth of base, in.	7	8
Dimensions of box table, in.	20x20x20	24x24x24
Net weight, including motor and table, lb.	7,000	12,000

An approximate comparison of the power consumed by the larger size of drill as contrasted with a standard geared radial of the same capacity showed a friction load of 0.8 hp. when the spindle and the feed gears were running at 330 r.p.m. as against 3.5 hp. and a wroking load of 8 hp. when driving a 1-in. drill at a speed of 338 r.p.m. with a feed of 0.022 in. per revolution of the spindle and drilling 7.4 in. per minute instead of 30 hp. which was the amount required by the geared radial when operating under the same conditions.

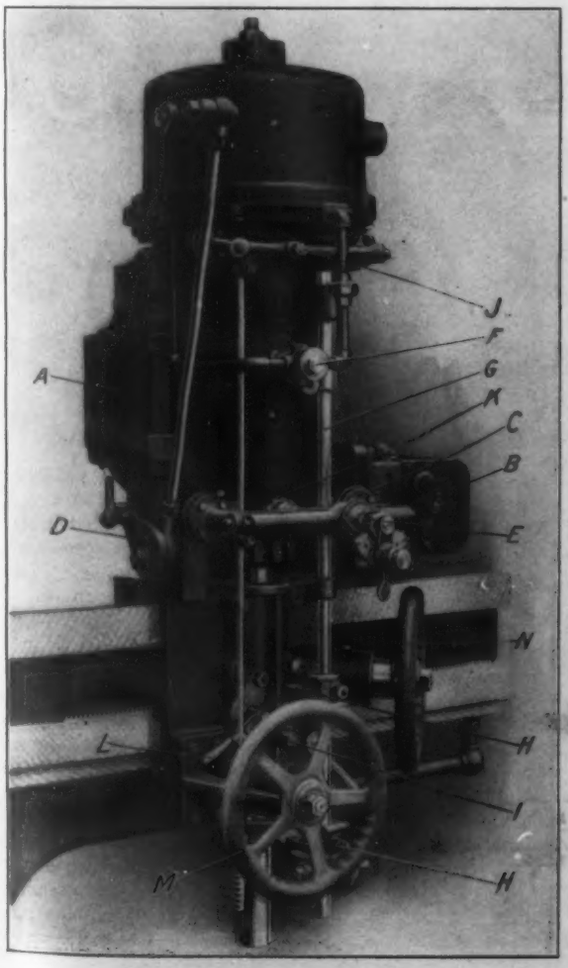


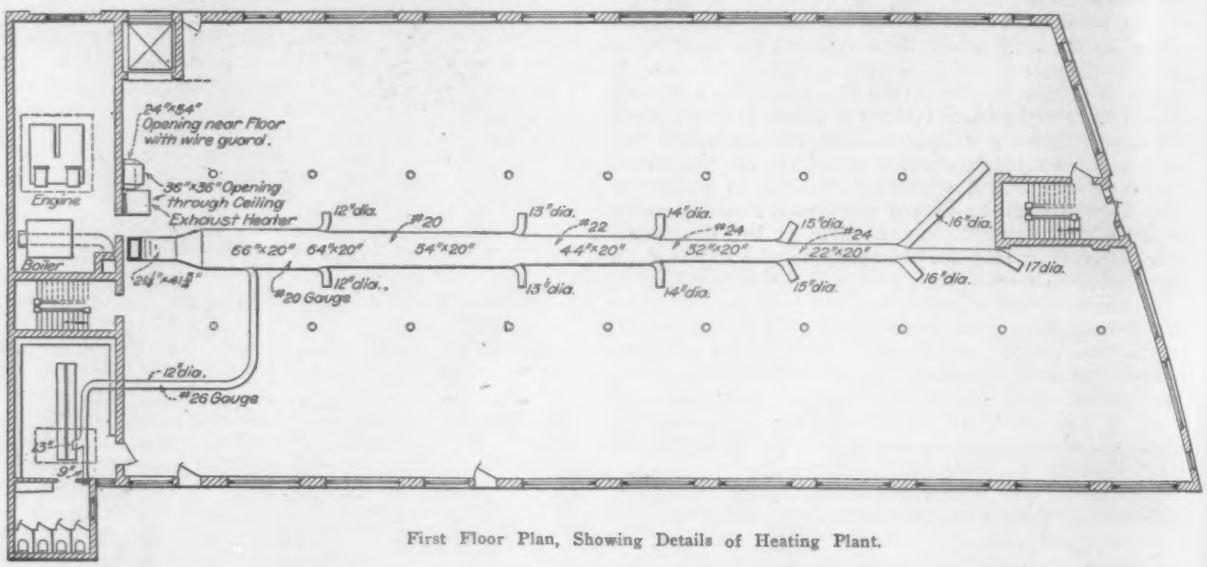
Fig. 2.—Details of the Head.

Gas Engine Wastes for Factory Heating

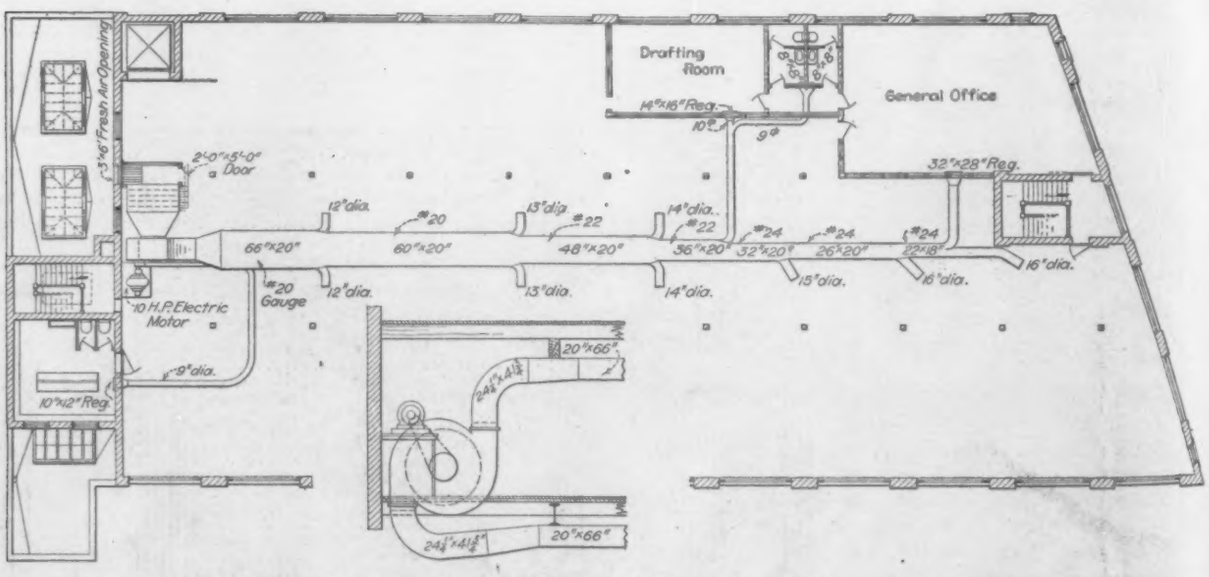
The Heat of Both the Exhaust Gases and the Jacket Water Used at Shops of the Hisey-Wolf Machine Company, Cincinnati

An unusually interesting factory heating system in that an equipment was developed to utilize the waste heat of a gas engine power plant has been installed in the electric portable drill making shop of the Hisey-Wolf Machine Company, Cincinnati. The exhaust gases from the engines are passed through a heater for heating water. The water, handled by a centrifugal pump, has itself already been warmed considerably by passage through the gas engine cylinder jackets, and it is forced from the exhaust

The Iron Age of May 4 in connection with a description of the features of the manufacturing arrangements for making grinders and portable electric drills. On the window level three-fourths of the wall space is glass. The building was erected from plans made by Harry Hake, a Cincinnati architect, and the heating system was designed by Robert S. Mayer, consulting heating engineer, Cincinnati. The heating plant was installed by Henry Niemes, Cincinnati.



First Floor Plan, Showing Details of Heating Plant.



Second Floor Plan, Showing Air Intake, Ducts, Blast Heater, Fan and Motor and Fan Connection.

gas heater to the indirect heater of a fan system of heating. In short, the shop has two floors each with a main air duct extending longitudinally through it with branch ducts to air distributing outlets. A double-discharge fan draws air in part or altogether from either out of doors or the shop interior and delivers it to the two air mains. The air before reaching the fan passes over the indirect heating surface and the heating surface is warmed by water taken cold by a centrifugal pump, and sent in turn through the gas engine jackets and through a heater designed for absorbing heat from the gas engine exhaust. A gas-fired hot water boiler serves as a relay for emergency demands.

A brief reference to the heating system was made in

Plans of the first and second floors of the shop are given in the accompanying illustrations to show the location of the heaters, fans, ducts and the main entrance at one end, with a stairway leading to the second floor, where are located the drafting room and the general offices of the company. At the rear of the first floor there is the power plant consisting of 85-hp. gas engines made by the Miller Improved Gas Engine Company, and in the engine room there is a hot-water heater with a capacity of 9400 sq. ft. of direct radiation, made by the Pierce, Butler & Pierce Mfg. Company, for use when the power plant is shut down for any reason or when the weather is sufficiently cold to make it necessary.

Just outside of the engine room is a reverse current

View of Part of Heating Plant—Pump for Circulating Water Heated in Gas Engine Jacket in Far Room; Exhaust Heater at Right of Door, Connections to Fan Blast Heater and Inlet Duct to Heater and Fan for Circulating Air in First Floor Shop Shown at Ceiling.

exhaust heater made by the Williams Tool Company, Erie, Pa. The exhaust from the gas engines passes through the heater in one direction, while water passes through the heater in the other direction. In the engine room there is a Buffalo circulating pump rated to handle from 65 to 70 gal. of water per minute against a head of 27 ft. It is driven by a Reno-Kaetker direct-current motor.

A 5-in. exhaust pipe from each of the gas engines connects with a 7-in. pipe which is insulated and connected with the exhaust heater. A 7-in. exhaust connection runs directly to the roof for use when the gas is not heating water.

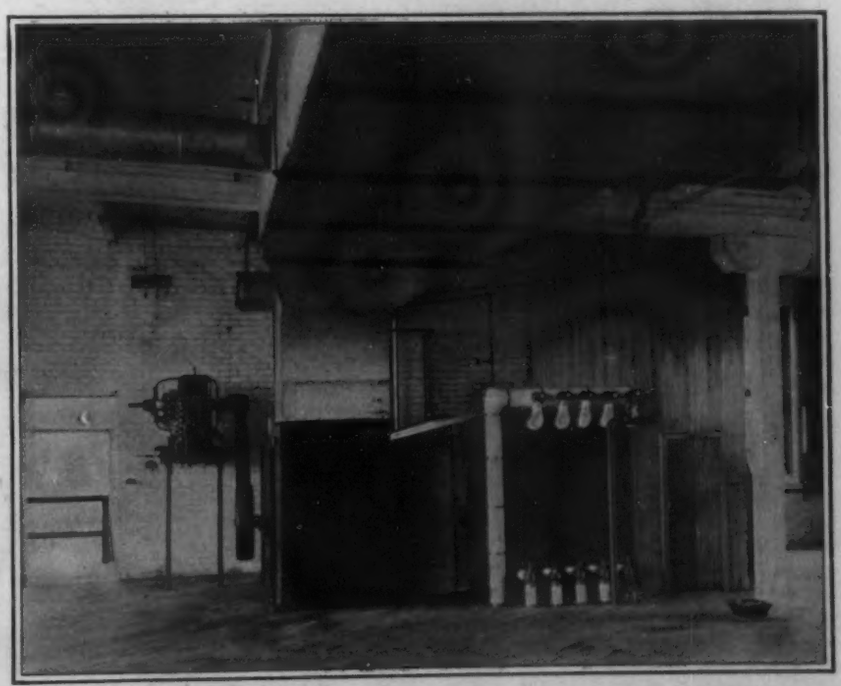
The indirect radiation of the fan heating system, comprising Vento cast-iron sections, is located on the second floor immediately above the exhaust heater and in the view showing the heater may be seen the flow header at the ceiling for the indirect heating stack. The fan is a 7-ft. Buffalo Forge blower rated to deliver 24,000 cu. ft. of air per minute and it is driven by a 10-hp. Jantz-Leist electric motor. The fan draws its air supply through the hot-blast radiators and can take it from out of doors through a 24 x 54-in. duct from the first floor, which changes to a 36 x 36-in. opening as it passes through the second floor, or from the second floor shop when the door is opened in the air shaft from out of doors. Dampers are provided to control the source of supply.

The connections of the Vento stack allow the heated water from the cylinder jacket and the exhaust heater to be circulated through the first and second row of sections without being run through the hot-water boiler, while the remainder of the sections are used in connection with the supplementary hot-water heating boiler, which is provided with a gas burner instead of a coal grate, as stated, to heat the water so that the shop can be warmed when the power plant is not in operation. This latter arrangement has been found to be most satisfactory in severe weather, due to the fact that a temperature of about 200 deg. must be carried in the water circulating through the blast heater in order to obtain the desired temperature in the air issuing from the distributing duct and to keep up a comfortable temperature in the shop.

Experiments have shown that there is a drop of about 30 deg. in the temperature of the water in the Vento stack when the outdoor atmosphere is about 50 deg. F. It was found not satisfactory to connect the supplementary heater in series with the cylinder jackets and exhaust heater, and consequently the connections are arranged so that the supplementary heater can be connected direct to the blast heater independent of the engine connections.

Tests made so far show quite a saving in the heating bill, and the water saving under the present arrangement is said to amount to about $1 per day. To effect a further saving it is the intention to install a cooling tower, through which the water must pass just before it is returned to the cylinder jackets, and by this means use the water over and over again. This is, of course, calculated to reduce the water bill very materially.

To control the system further and keep it under desirable working conditions there is a thermostat placed in the discharge from the cylinder jackets which controls a diaphragm valve admitting cold water to the circulating pump. By this means the temperature of the water is automatically maintained.



Motor for Driving Fan, Fan and Heater Connections, Air Supply Duct with Door for Circulating Air in Second Floor Shop and Overhead Air Distributing Duct.

The Standard Chain Company Makes Saddlery Hardware.—The Standard Chain Company, Pittsburgh, recently took over the following lines formerly manufactured by the P. Hayden Saddlery Hardware Company, Columbus, Ohio: Harness rings, bits, toggles, cockeyes, halter trimmings, hame staples, snaffles, hold back plates, hame back strap rings, breast rings, clips for wood hames, pinery hooks and dees, concord toggles, etc. These products it will manufacture at its plant at St. Marys, Ohio, where all the machinery and equipment have been taken, and the superintendent and foremen who had charge of these lines at Columbus are now employed. This places the Standard Chain Company in a position to take care of the saddlery end of the business of all jobbers who handle saddlery goods and enables the saddlery houses to buy, not only chains, but a more complete line from the company. The reputation of the Standard Chain Company for service and quality is such as will insure the maintenance of the high standard attained by the P. Hayden Saddlery Hardware Company.

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

A New Heavy Duty Drill Press

Recent Important Improvements Made by the Colburn Machine Tool Company

Some important improvements have been recently made in the line of heavy duty drill presses built by the Colburn Machine Tool Company, Franklin, Pa. The more important of these are the elimination of the right angle drive formerly employed, the addition of an entirely new type of speed box and the use of either standard or compound tables. Fig. 1 is a front view of the D-3 size, an end view showing some of the driving mechanism is given in Fig. 2 and Fig. 3 illustrates the tool equipped

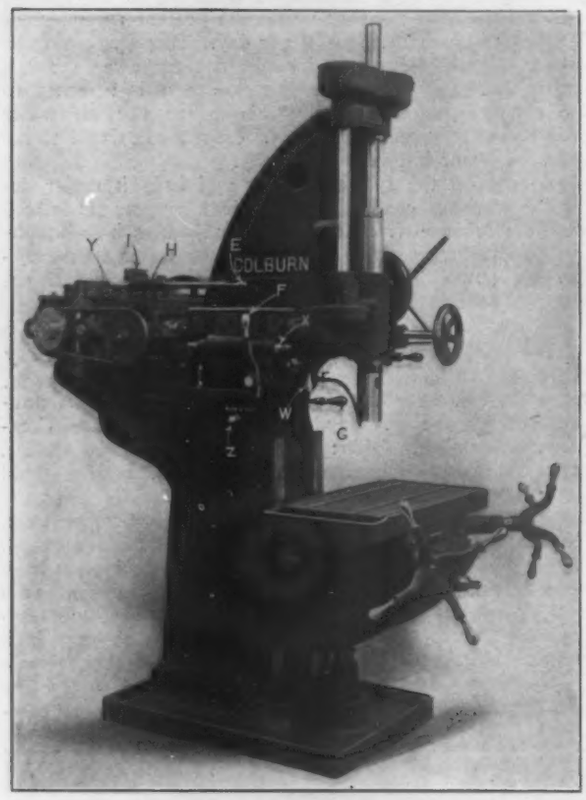


Fig. 1.—The D-3 Heavy Duty Drill Press with Compound Table Built by the Colburn Machine Tool Company, Franklin, Pa.

with the standard table and a two-jaw universal chuck.

In the original machine the right angle drive was used in which the main driving shaft was placed at right angles to the line shaft, an arrangement which necessitated the use of quarter turn belts when a number of machines were set in a row and driven from the same line shaft. In the new machine the main driving shaft on which the driving pulley is mounted is placed in the speed box and is parallel with the line shaft. In this way it is possible to set any number of machines side by side in a row and belt them directly to the line shaft with single belts. The machine is driven through a friction clutch pulley operated by the lever G, Fig. 1, and the drive consists of an oil tight box containing all the gearing from which the spindle speeds are obtained. As the drill press is of the high speed type the gears in this box run at high rates of speed and it is consequently impossible to make the changes in the speed when the regular clutch pulley is driving because of the severe impact caused by the sudden engagement of the gears and the clutches. An auxiliary friction clutch is interposed between the main friction pulleys and the gears in the speed box to overcome this objection and is controlled by the lever F. In this way the gears turn very slowly and the different speed changes can be made without jar or shock.

Speed and Feed Changes

The speed box, which is of an entirely new design, is mounted upon a substantial extension or knee at the rear of the main column. Eight speed changes are available and are secured through sliding gears and positive clutches controlled by the levers E and Z which are within easy reach of the operator while standing in front of the machines. The former of these levers gives four speed changes in practically the same way as the selective transmission of an automobile and this number is doubled by a set of back gears engaged and disengaged by the other lever. All of the speed box gears are steel forgings with the corners of the teeth beveled where they slide together and in addition the gears subjected to excessive strain are hardened. As the speed box is oil tight the gears run in a continuous bath of oil, a feature which adds to the life of the gears and the bronze bushed bearings as well as eliminating practically all noise. To indicate which gears are engaged a target, I, is provided on top of the speed box in plain sight of the operator.

Positive gears running in an oil tight box provide the feed changes, which are secured by a dive key and back gears, which are operated by the pull rods W and X respectively. Like the gears in the speed box, the feed change gears run in a bath of oil. Six feed changes ranging in approximately geometrical progression from 0.009 to 0.06 in. per revolution of the spindle are available. A large diameter worm gear graduated in eighths of an inch provides a direct feed on the spindle and enables the operator to measure the depth drilled accurately. This dial has an adjustable pawl that can be set to trip the feed automatically at any point up to 14 in., while it can also be tripped by hand from the operator's position. To protect the feeding mechanism from injury a second automatic trip is provided which operates when the spindle has reached its lowest position, thus preventing possible accident on account of feeding too far down.

The different speeds and feeds and the combinations of the levers by which they are obtained are shown on speed and feed index plate attached to the feed box. The whole operation of speed and feed changing is very simple and can be quickly made. By looking at this index plate the operator can see at a glance just what is necessary to get any desired feed or speed or he can tell by noting the positions of the levers and rods and comparing them with the index plate at just what speed or feed the machine is running. If for example it is necessary to secure a

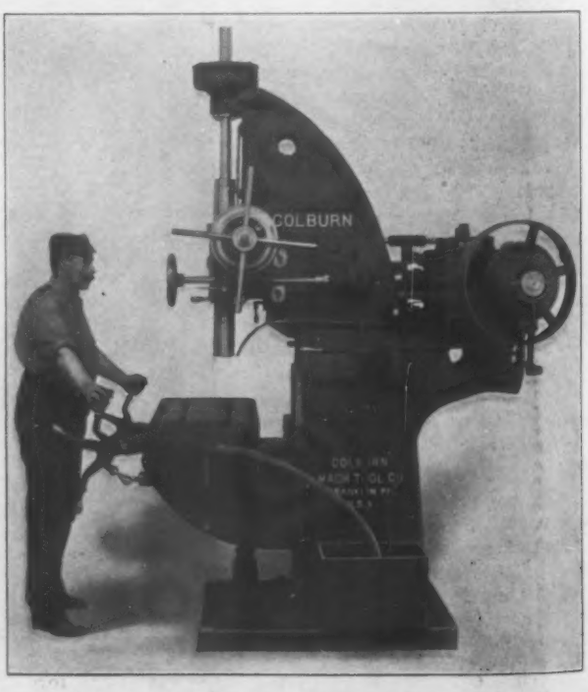


Fig. 2.—Side View, Showing Details of Drive.

spindle speed of 45 r.p.m., in which the lever Z is in the slow position and the rod Y at A, the operator first grasps the lever Z which controls the back gears and also operates

a positive clutch with his left hand and throws it in the proper direction. These changes should be made while the machine is at rest and if the gears are in the proper position so that the teeth will engage it will not be necessary to revolve them. If this is necessary, however, the operator can cause them to revolve slowly by pulling gently on the lever F with his right hand. This lever operates the auxiliary friction clutch and causes the gears to revolve slowly until they can be brought into engagement and also furnishes a means of regulating the speed at which they are turned very closely and avoiding damage to the mechanism. The face of the target I has four letters, A, B, C and D, and pointers traveling along the face of this target indicate the position of the two rods Y, that on the front rod indicating the positions C and D, while that on the rear rod indicates the other two. A pin on the lever E engages slots in the two rods Y, according to the way in which the lever is moved in its bearing H. When the lever is slid toward the rear the pin enters the slot in the rear rod, while motion in the opposite direction causes it to enter that in the front rod. Only one of these rods can be moved at a time and the pin cannot be moved from one to the other until both are in the neutral position, which is accomplished by a strip of metal fastened rigidly between the two rods with a single slot through which the pin will just pass. To change the pin from one rod to the other it is always necessary to bring the slot in both rods opposite that in the center strip, in which position the sliding gears are not in mesh. If the gears do not slide together in the position in which they come to rest they are revolved by operating the auxiliary friction clutch through the lever F until they can be thrown into engagement by the lever E. The actual sliding of the gears is accomplished by sidewise movements of this lever. For making changes when the machine is running at high speed it is necessary to bring it to rest, although for slow speed work it is possible to change the feed without doing so.

The compound table which is shown in Fig. 1 is furnished only when specially ordered. It is not an attachment to the regular table, but consists of a special knee with a table having a rapid movement through a spiral worm and rack, the limits being 20 in. longitudinal and 8 in. crosswise. Capstan handles are provided so that the operator can manipulate the table in both directions without moving from his position directly in front of the machine. It is claimed that these adjustments can be made so rapidly that the drill will reach any point within the area of the table surface, which is 16 x 30 in., in less time than it takes to adjust the ordinary round drill press table, while at the same time it is impossible for this table to spring as the massive knee and telescopic elevating screw effectually resist this tendency. Grooves along the edges of the table drain the lubricant from the surface into large oil pockets cast on each end, and a cored opening running entirely through the table drains the liquid from the pocket at the left side to that on the right, from which it is piped through a flexible tube back to the tank.

The standard table which is illustrated in Fig. 3 is of the bracket type and has an extra large bearing on the upright frame. A vertical adjustment of 15 in. through a large telescopic screw, operated by a crank handle in front of the machine, is provided. This screw is offset from the center of the spindle to permit the boring bar to pass through the table and does away with the necessity of cutting a hole through the floor to allow the screw to pass through when the table is dropped to its lowest position. A large oil pan is provided on both sides of the table and in front and the lubricant is drained off in the same way as in the case of the compound table. The working surface of the table, which measures 18 x 24 in., contains two large T-slots with an ample amount of metal over them.

Special chucks, fixtures, etc., can be mounted on either type of table and in Fig. 3 a two-jaw universal chuck, which is especially adapted for holding gear blank forgings and similar work, is illustrated. The jaws are detchable and special shapes can be fitted for holding irregular pieces having a maximum diameter of 12 in. Two sets of hardened steel jaws are regularly furnished with each chuck. In the engraving a 2½-in. high speed drill is shown drilling a hole in a steel gear blank at a feed of 4 in. per minute.

The machines are regularly equipped with a pump, tank and piping for supplying drilling compound when working in steel. The pump is attached to the outside of

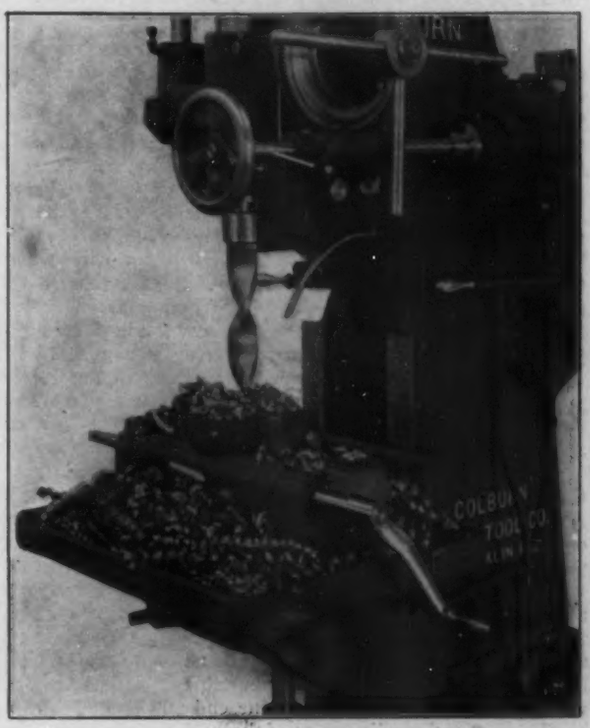


Fig. 3.—The Press Equipped with Standard Table and Two-Jaw Universal Clutch.

the speed box, and is driven by a short round belt from the pulley on the main driving shaft. The tank is placed at the lower right hand side of the frame in the most convenient position for draining compound away from the table and is entirely out of the way.

The following table gives the principal dimensions and specifications of the machines:

Drilling capacity in solid steel, in.	3
Boring capacity in solid steel, in.	8
Swing, in.	24
Distance center of spindle to face of column, in.	12½
Maximum distance spindle nose to standard table, in.	34
Maximum distance spindle nose to compound table, in.	28
Length of power feed, in.	16
Diameter of spindle sleeve, in.	3¾
Diameter of spindle driving end, in.	2⅛
Diameter of spindle in sleeve, in.	2¼
Diameter of spindle nose.	3 13/16
Morse taper in spindle.	No. 5
Width of steel rack in spindle sleeve, in.	1¾
Diameter of spindle driving gear, in.	10
Face width of spindle driving gear, in.	2½
Working surface, standard table, in.	18x24
Working surface, compound table, in.	16x30
Vertical adjustment of table, in.	15
Number of feed changes.	6
Minimum feed per revolution of spindle, in.	0.009
Maximum feed per revolution of spindle, in.	0.06
Number of spindle speeds.	8
Minimum spindle speed, r.p.m.	45
Maximum spindle speed, r.p.m.	520
Diameter of driving pulley, in.	20
Face width of driving pulley, in.	6
Speed of driving pulley, r.p.m.	500
Net weight, plain table, lb.	4000
Net weight, compound table, lb.	4400
Floor space required, in.	80x34
Overall hight, in.	112

If desired the drill press can be arranged for motor drive, in which case a special bed plate having an extension for the motor is required. When this is used the motor stands directly under the clutch pulley to which it is belted, and the machine can be started or stopped by engaging or disengaging the clutch pulley without stopping the motor. A motor of from 10 to 20 hp. operating at a constant speed is required according to the kind of work to be done.

A lubricator for driving chains has been patented by Archibald W. F. Steckel, Columbus, Ohio, assigned to the Jeffrey Mfg. Company, Columbus, Ohio. The patent number is 997,586, granted July 11, and covers a lubricant cup or receptacle carried by the chain mechanism, the cup having a cover which is automatically opened as the receptacle passes under the reservoir from which the lubricating medium is received.

New Combination Grinder

A Tool Embodying Four Machines in One

The Challenge Machine Company, Inc., 5116 Springfield avenue, Philadelphia, Pa., has recently placed on the market a new kind of combination grinding machine in which it is possible to change the position of the table so as to accommodate work that can be better ground with the wheel above it than below and vice versa. In this way it is possible to handle die or other very accurate grinding where the best results can be secured with the wheel above the work and also pieces where very rapid but less accurate work is required, as is the case when the wheel is placed below. Another special feature of these machines is that a wet tool grinding arrangement gives practically three machines in one, while for rough plain dry grinding the usual work rest is supplied. In Fig. 1 the grinder is shown with the table in the raised position, while in Fig. 2 the detachable surfacing arrangement is inverted, and Fig. 3 gives details of the grinder spindle bearing.

In Fig. 1 the plain work rest has been removed from the left side of the head and a serrated plate substituted. A U-shaped supporting arm for the table, both members of which are slotted and serrated to engage with this plate, is clamped to it by a bolt and binding nut. In this way it is possible to raise or lower the table quickly to accommodate the work as the proper adjustment for the true relation of the wheel and the table is simple and always obtainable. In addition to the adjustment provided by this serrated plate and arm, the table itself has an elevating plate which is hinged at one end and operated by a hand screw for fine adjustment of the work to the wheel. The vertical adjustment of the table is 16 in. from the centre of the spindle on the smallest size of machine and the distance outward from the inner side of the wheel is 4 in. in the two smaller sizes and 6 in. in the other two.

For doing extremely fine and accurate work, such as on dies and other pieces of a similar nature, the whole surfacing arrangement is inverted for passing the work under the wheel and in this case a plain inverted plate without any wheel slot is used, as illustrated in Fig. 2. This engraving also shows the plain work rest removed from the right end and a water arrangement for wet or dry tool grinding substituted. In this attachment the water is raised by a curved piece supported by a flat spring, which when depressed forces the water to touch the wheel. As will be noticed from Fig. 3, which gives details of the construction of the grinder bearing, the spindle is of large diameter, with long ring oiling bearings. One of the special features of this bearing is the cam set collar *a* which bears against the cam hubbed pulley at the left and provides a quick and secure means for taking up end play.

In addition to the wide range of work accommodated by providing the two methods of surface grinding in connection with the plain work rest and the water arrangement, the machine can be furnished for either bench or floor use. In the latter case a plain column can be supplied or one in which the countershaft is attached to it so that the machine can be placed in the most convenient location irrespective of the overhead work or if desired it may be mounted on a column to which any type of electric motor can be attached. Four sizes of machines, accommodating wheels ranging from 12 to 18 in. in diameter are built and if desired the smallest can accommodate wheels 2 in. thick.

Fig. 1.—A New Combination Grinder Built by the Challenge Machine Company, Inc., Philadelphia, Pa.

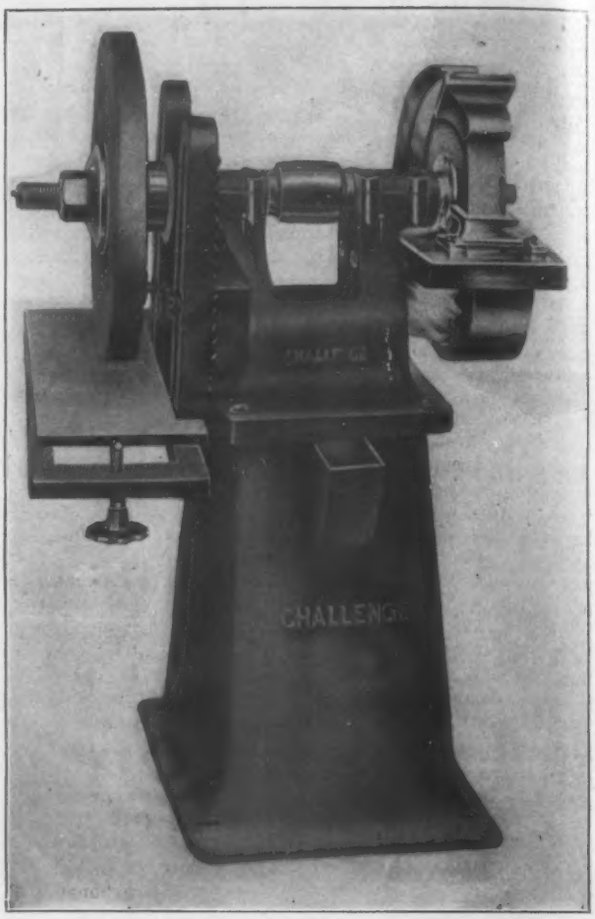


Fig. 2.—The Grinder with the Surfacing Arrangement Inverted.

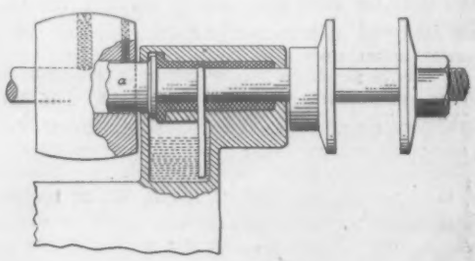


Fig. 3.—Details of the Grinder Spindle Bearing.

Observations on Case Hardening

With Special Reference to Influence of Nitrogen

In the issue of Metallurgie for February 8, 1911, appears an article by Dr. J. Kirner entitled "Observations on Case Hardening, with Special Reference to the Influence of Nitrogen." A certain case hardening mixture, which is called A1, had the following composition:

Carbon	31.5	Sulphur	0.5
Salt	41.0	Insoluble residue	18.0
Total nitrogen	9.0		

The insoluble residue, when dissolved in acid, was found to consist chiefly of oxide of iron, alumina and lime. This mixture gave an active carbonization at the low temperature of 600 deg. C., as shown by a microsection, and continued the influence up to 800 deg. C. A sample of steel held at 700 deg. C. for four hours showed a continuous outer layer of cementite that in the unannealed condition was so hard as to be cut only with a diamond.

If the temperature is raised there is a range from 870 deg. C. to about 920 deg. C., within which the samples show on the outer surface parts with high and low carbon contents. This is illustrated by microsections. The most careful mixing of the material and repeated carrying out of the tests gave no greater uniformity of results. This strange behavior of the mixture was the cause of a research, some of the results of which seem worthy of publication.

The material worked with was a soft steel with about 0.1 per cent. carbon. It was heated to 700, 900, and 1000 deg. C. in three different case-hardening mixtures, and the changes in the ordinary constituents and the nitrogen determined. The case-hardening mixtures were the A1 mentioned before; C1, another nitrogen-holding mixture made of freshly charred pieces of waste leather; B1, a nitrogen-free mixture, consisting of wood charcoal and carbonates of the alkali metals.

Preparation of the Samples

From previous experiments the depth of carbonization or case for four hours' treatment, exclusive of the heating-up and cooling period, should be 0.15 mm. for 700 deg. C., 1.00 mm. for 900 deg. C., and 1.50 mm. for 1000 deg. C. The turnings were taken in the positions shown in the diagram, the sample being originally 13 mm. in diameter, 160 mm. long. The turnings from position I were removed before the treatment, so that the samples worked upon were all of the shape shown in No. 2. This was to see if the outer layers gave any different result. The turnings at the end of the bars and at the junctions of the layers II, III and IV were thrown away.

The pieces were packed in an iron box, luted with clay, which was heated in a gas-fired muffle furnace. The muffle was brought to the desired temperature and the box introduced. As soon as the inside of the box attained the temperature of the muffle, shown by pyrometers, the time was taken. At the end of four hours, during which the temperature was not allowed to increase more than 10 deg. C., the gas was turned off and the samples cooled in the furnace.

The Results Obtained

Mixture A1, Containing 9 Per Cent. Total Nitrogen.

Layer.	Temp.	Car.	N.	S.	P.	Si.	Mn.
I	700° C	..	0.006	....	....	...	...
II	700° C	0.45	0.55	....	....	...	...
III	700° C	0.15	0.14	....	....	...	...
IV	700° C	0.58	0.56	....	....	...	...
I	900° C	0.11	0.004	0.037	....	...	...
II	900° C	0.50	0.033	0.033	....	...	...
III	900° C	0.14	0.009	0.037	....	...	...
IV	900° C	0.54	0.035	0.033	....	...	...
I	1000° C	...	....	....	....	...	...
II	1000° C	0.73	0.032	0.032	0.014	0.09	0.48
III	1000° C	0.19	0.012	....	....	...	...
IV	1000° C	0.83	0.030	0.034	0.015	0.10	0.48

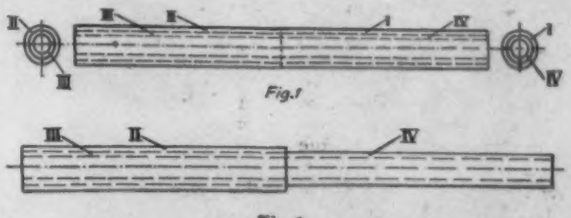
Mixture C1, Charred Leather.

Layer.	Temp	Car.	N.	S.	P.	Si.	Mn.
I	700° C	0.13	0.007	0.037	....	0.09	...
II	700° C	0.27	0.40	0.036	....	0.10	...
III	700° C	0.14	0.007	0.037	....	0.09	...
IV	700° C	0.25	0.40	0.036	....	0.09	...
I	900° C	0.12	0.007	0.037	0.014	0.07	0.48
II	900° C	0.34	0.11	0.034	0.015	0.08	0.48
III	900° C	0.14	0.020	0.041	0.016	0.06	0.49
IV	900° C	0.24	0.15	0.045	0.015	0.08	0.48
I	1000° C	0.11	0.010	0.040	0.015	0.08	0.48
II	1000° C	0.55	0.050	0.039	0.016	0.08	0.47
III	1000° C	0.22	0.020	0.040	0.015	0.07	0.48
IV	1000° C	0.57	0.045	0.044	0.015	0.07	0.48

Mixture B1, Without Nitrogen.

Layer.	Temp.	Car.	N.	S.	P.	Si.	Mn.
I	700° C	0.13	0.007	0.042	....	0.08	...
II	700° C	0.30	0.005	0.043	....	0.08	...
III	700° C	0.15	0.005	0.041	....	0.08	...
IV	700° C	0.27	0.005	0.044	....	0.08	...
I	900° C	0.11	0.007	0.037	....	0.09	0.48
II	900° C	0.72	0.012	0.036	0.015	0.08	0.48
III	900° C	0.18	0.007	0.038	....	0.08	...
IV	900° C	0.72	0.012	0.032	0.015	0.08	0.48
I	1000° C	...	0.006	....	....	...	...
II	1000° C	1.00	0.012	....	....	...	...
III	1000° C	0.42	0.009	....	....	...	...
IV	1000° C	1.02	0.012	....	....	...	...

The nitrogen was estimated by Braune's method, as given in his dissertation for the doctorate at Basel, 1905. From the tables it may be seen that there is no important change in the sulphur, phosphorus, silicon and manganese. For this reason they were not determined in every sample. When using mixtures containing much nitrogen, the nitrogen of the outer carbonized layers is seen to be considerably increased at certain temperatures. The results at 900 deg. C. with mixture A1 are very low, however, compared with those obtained with C1. The nitrogen-free mixture, B1, gives a more constant increase of carbonizing power with increasing temperature than the other mixtures. In the case of mixture A1, at 700 deg. C., the very hard and



The Influence of Nitrogen in Case Hardening
Fig. 1 is the sample before position I has been removed. Fig. 2 is the sample as worked upon in the tests.

brittle outer layers, when being turned off with a diamond, showed a great tendency to fly off and be lost. Finally, the results show that the mixtures containing nitrogen are much more energetic in proportion at 700 than at 900 deg. C.

The microscope shows in the very slowly cooled steels, in the layers with a notable amount of nitrogen, a peculiar brownish yellow constituent which the author calls "flavit." This is after etching with a 5 per cent. solution of picric acid in ethyl alcohol. It appears to be a solid solution and is very similar to the structureless hardenite of properly hardened tool steels. It is very distinct from either granular or laminated pearlite. From the location of this constituent, it is fair to assume that it consists of iron, nitrogen and also some carbon.

After heating and quenching the samples show nothing unusual. The flavit appears to be soluble in martensite. The experiments give no clear explanation for the un-uniformity noticed between 870 and 920 deg. C., with mixture A1, but it appears probable that the mixture segregates at this critical temperature, and the various parts then have a different influence on the steel. G. B. W.

Heat-Treating Furnaces.—Tate, Jones & Co., Pittsburgh, Pa., have recently placed on the market three types of heat-treating furnaces. One of these, which is a pack hardening, case hardening and annealing furnace using oil or gas as fuel, is designed for handling larger pieces in greater quantities than can be done economically with the smaller sizes generally employed. Its special field is work requiring the maintenance of a high temperature for some time and for annealing automobile parts, both packed and unpacked, and long bars without packing. The second furnace is of the semi-muffle type, and is specially designed for hardening and annealing high speed and carbon steel tools, while the other is a tempering furnace which can be equipped with bath pots of various shapes and sizes to meet the requirements of each particular case. Both of these furnaces employ either oil or gas as fuel.

The National Rivers and Harbors Congress, Cincinnati office, has published in pamphlet form a monograph by S. A. Thompson, entitled "Waterways as Creators of Prosperity," which Joseph E. Randsdell, the president, says in a preface contains the clearest and most forceful presentation of the transportation subject which has yet been made. The pamphlet contains 39 pages.

A Motor-Driven Hole Grinding Machine

The Garvin Machine Company, Spring and Varick streets, New York City, has recently applied motor drive to its No. 2 hole grinder, which was illustrated in *The Iron Age*, December 29, 1910. This arrangement elimi-

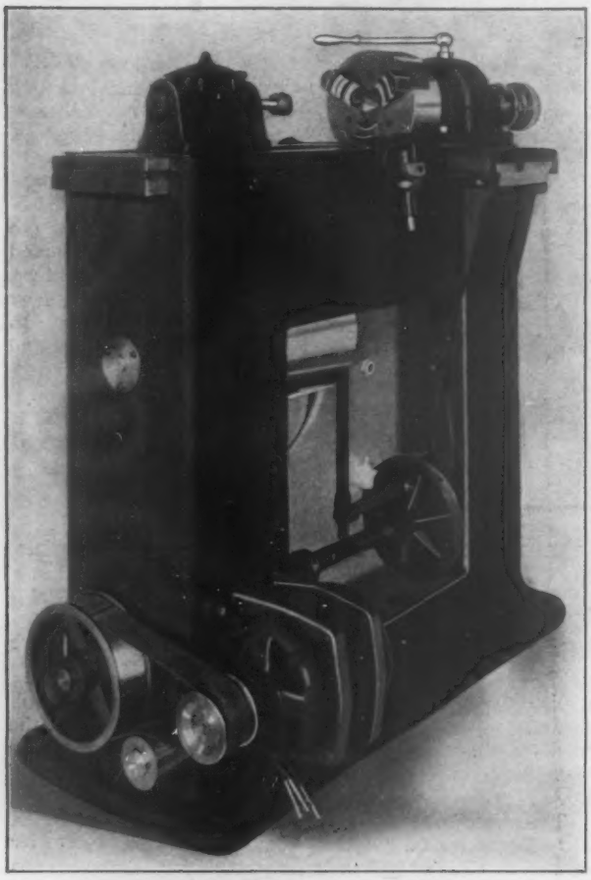


Fig. 1.—A Hole Grinding Machine with Motor Drive Built by the Garvin Machine Company, New York City.

nates all the gears and makes the outfit a self-contained unit, as illustrated in Fig 1, while a section through the spindle giving details of its construction is given in Fig. 2.

The motor is bolted to the rear of the machine and the drive is by belt to the main shaft with an idler to secure the proper tension. The machine is driven by a 1-hp. motor, which can be operated on either direct or alternating current. If desired the outfit can be furnished for grinding special shapes, such as drawing dies for brass rod or tubing, bell mouthpieces or circular grooves. This is accomplished by using adjustable cams for automatically swiveling the grinder head to the required shape which has to be ground. Where it is necessary to employ water as a cooling agent in connection with the grinding operation, a water attachment can be furnished.

The wheel spindle which is shown in detail in Fig. 2 is made of tool steel and runs in high speed DWF ball bearings. A special spindle having a long overhanging bearing that the wheel spindle runs in is furnished for some classes of work. The small wheels are mounted with a stud and a washer, while for mounting the larger sizes the end of the spindle is tapered to receive the wheel bushing which is held in place in the same way as in the case of the smaller wheel.

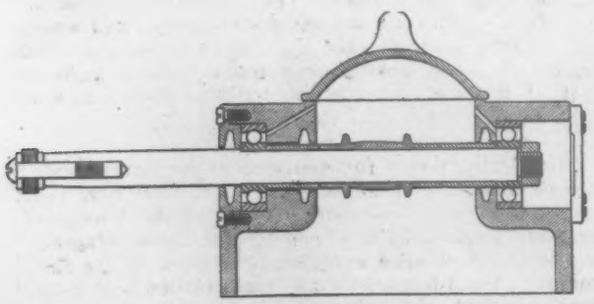


Fig. 2—A Section Through the Spindle.

The Twentieth Century Loose Pulley Oil Cup

The principle of centrifugal force is utilized in a new automatic loose pulley oil cup which has recently been placed on the market by the American Specialty Company, 834 Monadnock Building, Chicago, Ill. The advantages claimed for this device, which is known as the Twentieth Century automatic loose pulley oil cup, are supplying the proper amount of lubricant to the bearings without waste, freedom from adjustment, absence of moving parts

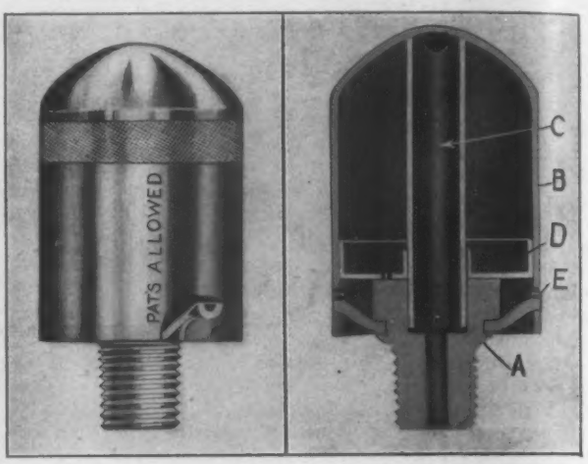


Fig. 1.—The Cup Ready to Screw Into the Pulley Hub.

Fig. 2.—A Sectional View, Showing the Feeding Tube.

Two Views of the Twentieth Century Automatic Loose Pulley Oil Cup Manufactured by the American Specialty Company, Chicago, Ill.

with a consequent elimination of wear, light weight which avoids the necessity for counterbalancing and reliability in operation. Figs. 1 and 2 are two views of the cup, the former showing it ready to screw into the pulley hub, while the latter is a sectional view showing the feeding tube. Fig. 3 illustrates the cup taken apart for filling, which can be done in any position of the pulley.

To use the device the cup B is first removed and the threaded nipple A is screwed into the oil hole in the loose

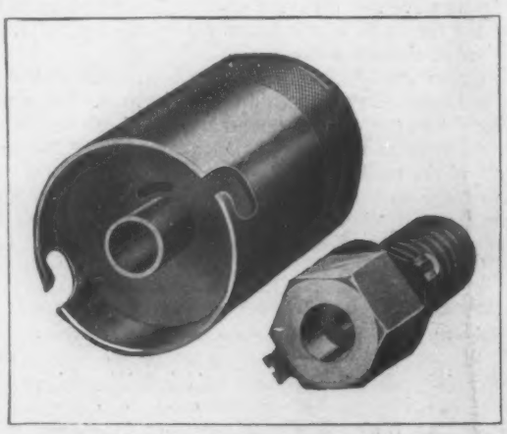


Fig. 3.—The Cup Ready for Filling.

pulley hub. The cup is then filled through the feed pipe C, the air escaping through the small vent hole in the bottom D. The cup is next placed in position on the nipple A, as shown in Figs. 1 and 2, with the feed pipe inserted therein. The cup is now rotated slightly to engage the spring E in the socket, which locks the cup in place.

When the pulley is rotating, centrifugal force carries the lubricant to the apex of the cup and forces it into the tube C until it is entirely full. This tube, which is apertured at the top, serves to measure the charge of oil to be delivered to the bearing. The rotation of the cup around the shaft draws a small quantity of lubricant to

the bearing, and thus the proper amount of oil is measured and delivered without any waste due to flooding.

When it becomes necessary to fill the cup it can be easily detached from the nipple, as illustrated in Fig 3, by hand, and as the cup can be removed, filled and replaced with the pulley in any position it is not necessary to shift the belt or turn the shaft to bring the oil hole on top. Pressed steel of a very light gauge is used in making the cup so that no necessity exists for counterbalancing it. Although of light weight, the absence of moving and wearing parts provides ample strength.

Some Recent Drilling Records

Demonstration Test of Twist Drills at Atlantic City, N. J.

At the recent joint conventions of the Railway Master Mechanics' and Master Car Builders' associations held at Atlantic City, N. J., June 14 to 21, 1911, great interest was aroused by some phenomenal results obtained in a demonstration test of twist drills. As the durability and efficiency of tools are such important factors in economical production, these results should be welcomed by all interested in this subject.

The Cleveland Twist Drill Company, Cleveland, Ohio, had a Foote-Burt No. 25½ high-duty drill press in operation in connection with its exhibit, and the results obtained from tests of Cleveland milled and flatwist drills taken from stock are tabulated below:

Complete Official Record of Tests.

Size and kind of drill.	Material.	R. P. M.	Feed per rev.	Inches drilled per min.	Peripheral speed in ft. per min.	Cu. in. metal removed per min.
1¼" Paragon	Cast iron 3½" thick	500	0.050	25	163.6	30.68
1¼" "		325	0.100	32½	106	39.88
1¼" "		475	0.100	47½	155	58.29
*1¼" "		575	0.100	*57½	188	70.56
1½" "		300	0.030	9	117	15.90
1½" "		325	0.100	32½	127.6	57.43
1½" "		335	0.100	33½	131.5	59.19
1½" "		355	0.100	35½	139.4	62.73
1¾" "		235	0.100	23½	107.6	56.52
1¾" "		350	0.100	35	160	84.19
2 5/16" "		190	0.050	9½	115	39.90
3" "		120	0.100	12	94	84.82
1¼" "	Machinery steel 4¼" thick	350	0.030	10½	113.7	12.88
1⅝" "		225	0.040	9	94.8	18.66
2 5/16" "		165	0.020	3¼	100	13.65
2 5/16" "		200	0.020	4	121	16.80
2½" Milled		150	0.015	2¼	98	11.04
2½" "		150	0.040	6	98	29.45
2½" "		175	0.040	7	114.5	34.36
1¾" Paragon		275	0.030	8¼	125	19.84
3" "		150	0.030	4½	117.8	31.81
3¼" "		150	0.030	4½	127	37.33

*This is the highest drilling speed on record.

The following comments on these remarkable results are made by the Cleveland Twist Drill Company:

The first tests were made for the purpose of demonstrating what is good shop practice; that is, the drills were put through at speeds and feeds that would be economical under average shop conditions. Then, to demonstrate the reserve efficiency and durability of the drills, "stunts" which demanded extremely high rates of speed and feed were attempted.

The highest rate of speed in drilling known to machine-shop practice was attained by a stock 1¼-in. Paragon Flatwist high-speed drill in successfully removing 70.55 cu. in. of cast iron in one minute, repeatedly cutting through a heavy billet at the record-breaking rate of 57½ in. per min., nearly an inch per second. This drill ran at 575 r.p.m. with 1/10 (0.100) in. feed per revolution, successfully withstanding the terrific strain of this extreme speed and feed. Before attaining this maximum performance, which was approached gradually, numerous other Cleveland drills were put through at the rates of 25, 32½, 33½, 35 and 47½-in. per min., as can be seen from the complete record of the tests. In no case was the limit of strength of the drills reached, but the speed of 57½ in. per min. could not be exceeded on account of the inadequate capacity of the electric feed wires which brought current to the motor driving the drill press.

Drilling at such high speeds and heavy feeds is not to be recommended as economical shop practice, and this performance will in all probability not be repeated in many shops. These results were only made possible by carefully established ideal conditions, such as the following: Absolute rigidity in the machine, uniform and sufficient driving power, solid clamping of the work, perfect grinding of the tool and most expert handling. They are of value chiefly as demonstrating the power and rigidity of the machine and the exceptional reserve strength of the drills.

Another noteworthy test was made with a 2½-in. milled drill from stock. It drilled 68 holes through a billet of

Facsimile of the Bulletin which Gave the First Detailed Announcement of the Record Test in Drilling Cast Iron.

machinery steel, 4¼ in. thick, without being reground. This drill was operated at 150 r.p.m. with a feed of 0.015 per revolution, removing a total of 1418 cu. in. of material. Although the drill was still in good condition the test was cut short at this point by the convention coming to a close. This test demonstrated what can be done all day long in any shop properly equipped, and is indicative of what results should be expected in economical high-speed drilling.

Credit Unions for Employees.

The retail trade board of the Boston Chamber of Commerce has issued a report on the Massachusetts statute authorizing the incorporation of credit unions, of which a number have already been established in the state. In explaining the system the board says:

Under this act, which is cooperative in principle, the workingman and employe may create his own loan company; only honest and industrious persons are admitted to membership; loans may be made to members only; a borrower may offer either property or the indorsement of one or more members as security for his loan; no loan shall be made unless the credit committee approves the object for which the money is to be used; the use of the money for any other purpose renders the borrower liable to expulsion from membership; at all meetings a member has only one vote, irrespective of the number of shares he or she owns. These credit unions are in effect associations of the lenders themselves, receiving the benefit of the money they loan. Recent data show that there are more than 25,000 of these institutions in operation in European countries, having a membership of over 3,000,000 and total assets of $1,000,000,000, and that they have been of great advantage and service to the communities in which they have been established. They constitute a medium through which farmers and small tradespeople and workmen of good character and industrious habits may join together to collect small savings and to provide loans to those of their associates whose credit is not recognized by banks of discount.

Bomb calorimeters for determining the heating value of the combustion of solids, liquids and gases have been made the subject of Circular No. 11 of the Bureau of Standards, Department of Commerce and Labor, Washington, D. C. A detailed explanation is given of the Government standardization of the manipulation and calculation practiced with [illegible]

S. DREDGER & SONS.
Mechanical and Civil Engineers
PITTSBURGH, PA.

The Standard Welding Company's New Addition

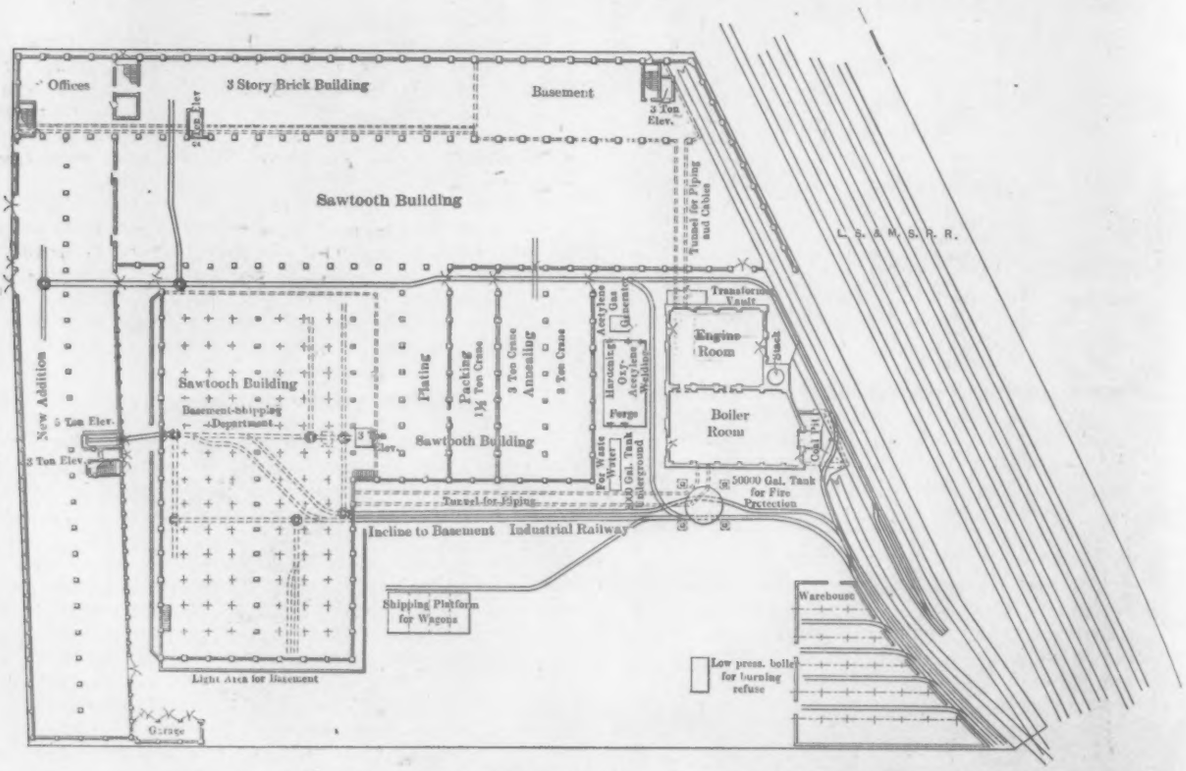
The Plant Is Now Double the Size of the Original One

Three years ago when the Standard Welding Company, Cleveland, Ohio, built a new plant it was thought that sufficient room had been provided for all the growth that could be expected in its business for a considerable length of time. The new plant had been occupied for only a short time, however, when it was found that a still larger capacity was needed. Minor extensions have since been made, and these have been followed by the erection of a large addition, which has just been completed, and which makes the company's present plant just double its original size in 1908. The Standard Welding Company was organized in 1899, its first plant having a floor space of 20,000 sq. ft. Extensions were graudally made until there was no room for further growth on the old site and a new plant was built in 1908 on a new site on West Seventy-sixth street, adjoining the Lake Shore Railroad tracks, which had a floor space of 125,000 sq. ft. The latest addition contains 80,000 sq. ft. of floor space, and together with the original plant and later extensions make a total floor space of 250,000 sq. ft.

The new extension is 350 x 60 ft., four stories high, without basement. Being joined to a section of the old plant it makes a main building 400 x 60 ft. The building is of beam and slab reinforced concrete construction, no steel being used except in the reinforcing. In the reinforcing cold-twisted reinforcing bars were used in preference to hot-twisted bars, as giving higher tensile strength and requiring less steel. Practically the only wood in the building is the window sash. The outer columns are 7 ft. 6 in. apart, the entire space between being taken up with the windows. For a distance of 50 ft. the front at either end is faced with brick. A row of concrete columns 15 ft. apart extends through the center of each floor longitudinally, allowing an open span of 29 ft. on either side. These columns measure 20 x 20 in., and for a short distance from the floor the corners are protected by angles. The floor slabs are 4 in. thick, with 1 in. additional for the finish. The girders and the beams are 12 x 20 in., the columns, beams and girders being the same size throughout the building. The spandrel walls beneath the windows are of reinforced concrete. The roof is reinforced concrete, the same as the floors, over which is a false roof covered with tar and gravel. The ground floor is of brick. The three upper stories, exclusive of the office section, have granolithic floors, making a very hard and smooth surface and regarded as better wearing than cement. An unique feature is the extension of the windows up to the floor slabs, providing an abundance of light. The factory windows have balanced sash and the office windows counterweight sash. The building is lighted throughout with Cooper-Hewitt lights. There are two freight elevators, one of 5-ton and the other of 3-ton capacity. A passenger elevator will also be installed. The stairways and elevator wells are inclosed in hollow tile partitions.

The machinery is driven by a motor on each floor, connected to a line shaft running through the center. All shaft hangers and heating and lighting hangers are suspended from castings imbedded in the floors and walls. During the erection when the concrete was being poured holes were left in the beams and girders for all necessary pipes and wires.

The first floor will be used for the tubing department, the second floor for the machine shop and welding departments, the third floor for automobile rims, and one-half of the fourth floor for the office and the remainder for the experimental department. The preliminary plans for the building were prepared by the company. The Crowell & Sherman Company, Cleveland, was the contractor.

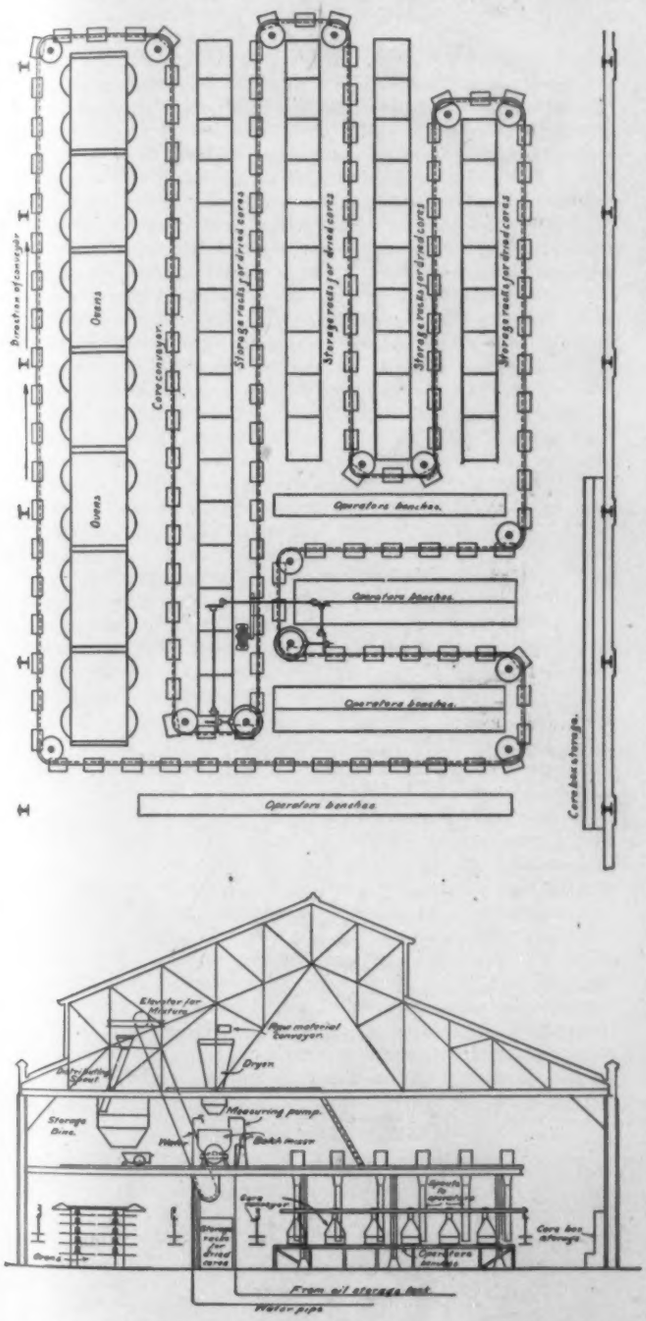


Plan of the Plant of the Standard Welding Company, Cleveland, Ohio, Showing New Addition.

The rapid growth of the electric welding industry during the past few years has largely been the result of the demand from automobile manufacturers for electrically welded rims and various automobile parts. When the Standard Welding Company started its first plant its products were confined largely to tubing and electrically welded seat posts and other parts for bicycles. The business rapidly developed with the demand for automobile rims, and various new uses for electric weldings have appeared. The company now makes seamless steel rims for automobiles, motor cycles, bicycles and all kinds of commercial vehicles and trucks, seamless steel tubes, numerous automobile parts and specialties, and a large number of electrically welded products used in other industries.

A Core Room Conveyor System

A core-making equipment which has recently been installed in the foundry of the T. H. Symington Company, Rochester, N. Y., contains some very interesting apparatus designed to reduce the large overhead cost for unproductive labor which is characteristic of the core room, a special feature being the conveyor system. The plans are by George K. Hooper, Hooper-Faulkenau Engineering Company, 165 Broadway, New York. It has already been demonstrated that satisfactory speed and economy have been obtained. The general layout of the core room and the conveyor is shown in the line drawings.



The Conveyor System for Handling Cores in the T. H. Symington Company's Foundry.

The core-makers' benches are compactly arranged close to the battery of ovens, while near at hand to both benches and ovens is a set of cooling and storage racks. Passing close to these to serve them all is a conveyor consisting of cars of two shelves each, suspended at about bench height from an overhead rail, and pulled by means of a chain above and supported by the cars. It carries green cores from the benches to the ovens; cooked cores from the ovens to the cooling and storage racks; cores from the storage racks as desired to unloading stations whence they may be carried to the molders; and finally it returns core boxes, driers and trays to the core-makers' benches. It is of simple design, consumes but about 2 hp., and after a year or more of operation is declared to break fewer green and cooked cores than hand transportation. Through its use the operative at any station does not leave his place.

The receptacles containing green cores are placed upon the carrier by the core-maker, who has merely to turn halfway around to do so. At the ovens they are received by the oven attendants and placed upon the oven shelves awaiting them, the cooked cores then being taken by the carrier to the storage racks. If necessary a station for washing and drying the trays and boxes can be established in the circuit at a convenient point ahead of the core-making benches. The laborers at the racks also load cores as desired upon the carrier for delivery at unloading points whence they are delivered to the molders.

In this foundry there are nine different shapes and weights of cores to be cooked and four different mixtures, and a total production of about 30,000 cores per day. A difference must be made in the cooking of the several kinds of cores; while at the same time the continuity of operation of the system must be retained. The oil-fired ovens, therefore, are of the independent circular shelf type, the shelves being of different sizes to accommodate the various cores. The ventilating apparatus consists of hoods over the fronts of the ovens connected with exhaust apparatus.

Poor's Manual for 1910

Poor's Manual for 1910, the forty-fourth annual number, just issued, shows that in 1910 gross earnings of the railroads increased $291,368,000, or 11½ per cent., and net earnings $66,907,000, or 8 per cent. Most of the railroads end their fiscal year June 30, but the foregoing figures include the annual reports of the railroads issued December 31, 1910.

During the year 1910 the railroads built 3751 miles of new track, against 6310 miles for 1909, 3918 miles for 1908, and 5362 for 1907. The new securities issued for the year include $350,000,000 stock, $582,000,000 bonds, and $116,000,000 notes.

Last year's new mileage, amounting to 3751 miles, and bringing the total up to 242,107 miles, compares with that of other years as follows:

	Miles.		Miles.
1910	3,751	1900	3,444
1909	6,310	1899	4,008
1908	3,918	1898	2,219
1907	5,362	1897	1,822
1906	5,425	1896	1,654
1905	4,947	1895	1,700
1904	5,059	1894	1,899
1903	4,397	1893	2,346
1902	4,193	1892	4,441
1901	4,481	1891	4,206

The rolling stock of the railroads at the end of each of the past three years consisted of the following:

	1910.	1909.	1908.
Locomotives	63,030	60,601	61,030
Cars:			
Passenger	37,985	36,245	35,601
Baggage, mail, etc.	13,173	13,449	12,341
Freight	2,297,620	2,180,324	2,176,321
Total revenue cars	2,348,778	2,230,018	2,224,263

After paying all charges, including dividends, the final surplus of the railroads for 1910 amounted to $171,709,000, against $107,861,000 for 1909, and $49,444,000 for 1908.

The Seattle Steel Company, Seattle, Wash., the rolling mill operated by the Pacific Hardware & Steel Company interests at Portland, Ore., and the Pacific Coast Steel Company of San Francisco, Cal., have been consolidated under the name of the latter concern, the present capitalization being $1,000,000. Judge Wilson of Seattle is president and D. E. McLaughlin vice-president. While many details have not been determined, it is proposed to continue rolling light bars at both the northern plants. The company's new open-hearth plant and rolling mill at South San Francisco is expected to begin operations in about 60 days.

Extract from a Pittsburgh letter to an Eastern financial paper: "The pig iron situation here is good and many furnaces are working day and night in order to keep up with demand."

The Schedule of the International

A Transition from Loss to Profit

BY CONNECTICUT.

"No, Johnson, I can't see it your way," Matlock, president of the Shelton Rolling Mills, spoke decisively. "Our policy has never permitted excessive expenditures nor the quick acceptance of new fangled notions. The report at the meeting last month showed a good dividend for 1910, and the directors, when they voted you in as superintendent, felt sure that your 10 years in the mill would give them a man who would run things as they had been run in the past—"

"But it is those very 10 years," broke in the younger man, earnestly, "that have shown me the crying need there is here for a change—have pointed out to me what a better system would do and where improvements are necessary. I can only say again, we must act before it is too late; must not let our competitors get too far in advance. It might cost us too much trying to catch up." He paused a moment as though to frame his words for maximum effect.

"You have told me that you felt the future to be safe because we sell our product at the market prices set by the International Brass Company and because we have always paid dividends selling at such prices. Have you seen their schedule for 1911?"

The crisp typewritten sheets crackled in the lean hands of the younger man as he offered them to his superior.

Matlock studied the sheets with rapidly narrowing eyes. "Are these lists official?" he asked sharply, his brows furrowed. Johnson nodded and, turning slowly, stood looking down the river valley with its tall chimneys and busy factories. He felt that the mood of the other was changing.

"These prices are absurd!" the president at last found voice. "What can they be thinking of to cut prices this way! We can't pay dividends at those prices." He sat down heavily, his nervous fingers drumming on the heavy table beside him.

"Mr. Matlock," said the younger man, turning to the other, "those prices are neither absurd nor do they mean the passing of a dividend, provided"—firm accent of emphasis—"provided you support me in the changes I have urged you to make. This mill can pay dividends, and good ones, at any schedule which will bring profits to the International!"

Stung into renewed confidence by the self-reliant determination which rang in the young man's voice, Matlock hesitated but an instant. "Johnson"—his voice was sincere—"I am ready to be convinced. I believe you can do it—I'll see you through."

Planning the Campaign

Relieved now from the dispiriting knowledge that he was fighting alone, Johnson gave heart and soul to the organization of a system which should give him a definite basis on which to build a price schedule, while at the same time he was showing up what bad spots existed. Filled with a virile enthusiasm for "the game" and primed with ideas and mental notes gathered in the past, when, as caster, roller or floor-boss he had grimed his hands and bent his shoulder on the mill-floor, he laid out a comprehensive expense sheet, which classified the labor and other expenses. Kept promptly posted, this sheet gave him the average cost per pound for casting, rolling, annealing—in fact, for each of the important operations in brass mill work. More than that, it gave the amount and nature of all his overhead expenses; told him the location of all expenditures for labor and for supplies. This information he caused to be collected from the regular office and payroll records, without any blatant announcements, heralding a "new system," which always prove so demoralizing. Like a tactful physician, he chose to take the pulse of the mill under normal conditions.

A month's patience brought him a set of records which he felt indicated pretty fairly the average mill conditions. Pressure of time made him accept these as a basis; careful analysis governed him in using them. With so much to accomplish, he did not dare to wait any longer before inaugurating some of the improvements by which he hoped to snatch back the profits which the new schedule threatened to take away. When the first month's expense sheet was brought to him and he had absorbed its contents, he made up a table of the necessary operations as required for the different gauges of 6-in. high brass. The figures sprawled across the sheet, in a rough symmetry characteristic of the man that made them; impatience marked their formation, the impatience of the runner before the pistol shot, of the football "sub" on the sidelines. For when he had extended his cost columns, pound multiplied by pound-cost, and struck the total; when his racing pencil had set opposite each total the corresponding price from the International schedule, there stood out in sharp contrast before him the full measure of the task. The margin, the difference between profit and loss, was gravely negative, and meant a stern and relentless battle against heavy odds—a one-man fight!

Watching Dollars, Not Cents

His judgment warned him that his first steps must be the big ones. Confronted by such widespread losses, simple logic told him to first watch the dollars and to let the pennies take care of themselves; to stop the big leaks first. For example, having always known that the casting shop was the slowest unit of the mill, he had 20 new fires going in half as many weeks, with the result that the output from his rolls increased 50 per cent. with a reduction in gross rolling cost per pound of 25 per cent.

The addition to the casting shop developed a new weak spot, however, in the annealing muffles. Worked night and day, the piles of metal waiting to be annealed blocked the floor space, seriously hampering production. Heavy-browed and vacant-eyed with mental absorption, he spent several days on the annealing floor, watching the great iron pans, piled high with yellow metal thrust into the yawning ovens; watched the heavy door descend, to remain closed for several hours. How to save time, to anneal more quickly—on this problem he concentrated his brain. It came to him at last, as it comes to all who study a thing patiently and thoroughly, and the solution was very simple.

The metal went into the ovens cold and took a long time to rise to a proper annealing temperature. Why not, he thought, use the waste gases from each muffle to raise the temperature of the next lot of metal going into it? Quickly his mind drew for him the picture of the two-story oven which was to do this for him. This double oven, together with the substitution of crude oil burners for cordwood as fuel, cut a gratifying slice from his annealing cost.

Some measure of encouragement he took from the discovery that certain gauges of brass showed less margin of loss than others, and he gave to Matlock a list of such widths and gauges as carried the least percentage of loss. The sales on these sizes Matlock agreed to push.

Mill transportation next occupied his attention. For years an unconscious thoughtfulness for the firm's best interests had wrung from him many smothered exclamations of disgust as he watched a half-dozen men awkwardly pushing great four-wheeled trucks laden with metal from one part of the mill to another. Soon two men, one on the floor and one in the cage of an overhead crane, did the work of 25 truckmen.

Details of Development

Experience and observation had told him that maximum efficiency and consequent low costs depended not a little on constant even flow of product through the mill from raw state to completion. To fill in the idle gaps which kept coming up in the natural run of orders he instituted a semi-finished stock plan. At odd times the casting shop made up quantities of bars of standard widths and alloys, which were rolled down at other odd times to a certain gauge and stored on racks. From this stock quick deliveries could be made by working these bars down into the gauges ordered.

Johnson eagerly awaited the expense sheets as the month ends came round. As each of the problems was attacked and solved the effect became at once apparent in the figures on these sheets. He found he was rolling metal a great deal cheaper, was annealing at about half his former cost per pound, and had cut down his overhead expenses noticeably by the installation of the crane and other improvements of a similar nature. His comparative cost tables now showed a great many more orders on which the margin between his actual cost and the International schedule was no longer negative, and Mat-

lock's efforts, through Bannister, their selling agent, had increased the sales on the better paying alloys and gauges.

Yet Johnson threw the November expense sheet on his desk after he had digested its contents and paced his office for upward of an hour. The results had been good, the improvement very gratifying, but—his rugged jaw and narrowed eye spoke silently of the dogged purpose within—but the gain had not been enough. There must be greater progress still!

All that had been done during the year had come from the workings of his intellect, and from his intellect alone. And as the early darkness of this December day threw its dusk into the simply furnished office of this resolute man, he felt vaguely as so many leaders feel at such crises, that, after all, it was not a one-man's task—his must not be the only shoulder against the wheel.

How to league the working force as eager allies; how to bring to maturity the ideas for betterment and economy which should evolve from a thousand brains; how to bring a thousand lusty shoulders to bear on the wheel—this became his new problem. Human beings, not machines or furnaces were now to be his pawns; human beings with their strange whims, their innate selfishness, their ponderous inertia in the face of innovation. These beings he must so move, through whim and selfish aim, that the inertia should become impetus, until the following of whim or selfish aim should be turned into mutual benefit. No plan, Johnson felt, could succeed long which had basis in unjust or uncertain reward of effort, and he proposed to bring about conditions in which strong, continued incentive to maximum effort and efficiency existed in each part of the mill. After deliberation he broached his plan to Matlock.

"It won't do!" the latter vehemently protested. "You'll upset the whole place! Every man Jack of them will lay down the moment you try to cram your piece-work schemes down their throats. Why man, there is not a single brass rolling mill in the country to-day,"—he smote heavy fist into broad palm—"which operates on a piece-work basis! Look at the mess they got into at Stamford—men leaving them and orders canceled because of failure to deliver. Frankly Johnson"—he regarded the other with elevated brows—"I am astonished to hear you make such a proposal."

The Human Element

Fortunately good judgment and discernment fought conservatism in Matlock's makeup. In the end Johnson was again assured support. If it had not been so, then this could not have been written. Of the fact that with unwisely chosen piece-rates the worker loses efficiency, if, indeed, he does not become wholly discouraged, Johnson readily admitted the truth. With the rates set too high, "cutting" surely follows, while very low rates "wet blanket" the men from the start.

He explained to Matlock that the success of his plan called for, first, extreme care in fixing the rates; second, some added feature which should allow the effects of increased efficiency to profit both employer and employee alike, and, third, the introduction of the scheme in such a way as should make it welcomed by the mill hands. And before he left Matlock's office he had unfolded a plan of campaign at which the older man had chuckled.

"When you first put the thing up to me," he told Johnson, "I was afraid I would have to give up my month's trip west. Now I think I'll make it six weeks," he laughed. "You'll not need me here, I guess."

Gaining his desk, the young man spent the rest of the day in making up a piece-rate schedule. He used his monthly expense sheets and assumed an increase in efficiency of 25 per cent. would follow the acceptance of the schedule. To prove the wisdom of his choice of rates, he had his time clerks start a separate set of records to run a month or so as a test. These records showed how much each man would have earned if the rates had been in use.

He could hardly have chosen a better time than December in which to try out his rates. With the books full of orders and the shipping dates on the two government arsenal contracts falling due, the output of the mills was unusually high, so that a few weeks' trial showed his schedule to be, with slight exceptions, quite safe to use. So, on Christmas week the hoarse blast of the great mill whistle signalled a shutdown and gathered all the men on the mill floor a little while before noon hour. From the iron platform halfway up the side of the great engine Johnson faced them all, nodding good naturedly to some of the brawny mill bosses who stood about with folded arms.

Winning the Workmen

"It's almost New Year, men, and time for congratulations," he said, when his lifted hand had brought silence. "I'm not sure whether you know it, but you have all done so splendidly these last few months, the mill production has been so high, that you deserve congratulations; and I congratulate you." A murmur answered his smile.

"But there is one thing about the matter," he went on earnestly, "there is one side of the question which may, or may not, have occurred to some of you. It is this. You have all worked, and worked hard, to get enough metal through the mill to meet the demands of our customers. In December we shipped more metal than in any previous month since the mill was built, and, of course, that means more business and more profit to the concern." He paused a moment.

"Have you not sometimes felt,"—he spoke with incisive directness—"have you never thought that there should be some added reward to you for all this extra hard work? Would you not work with a better spirit, with more satisfaction, if you knew it meant a fatter envelope on pay-day?" Several heads nooded slowly in approval, yet in ignorance of what was to follow.

"I am sure a great many have felt exactly that way; I have often felt so myself and know it to be natural. This meeting I have called this noon for no other purpose than to discuss ways and means to right this matter. Your employers have formed a plan which they hope will meet with the approval of all of you. I want you to come halfway, and give it your sober consideration."

Rapidly, then, he outlined his system of piece-work, explaining the method by which he had arrived at the rates on the schedule. Flushed faces and not a few heated murmurs greeted his first words as the intent of his remarks became plain. But a faith in him, grown strong in the years he had worked among them, made them listen gravely. He explained carefully the redeeming feature which raised his system above the others; told of the company's plan to share half and half with the men all excess earned over the regular day's pay, guaranteeing no cuts in rates except where agreeable to a committee chosen by the hands from among themselves.

The Extra Wage Slip

"And now I want you all to think over the matter seriously," he concluded earnestly. "In your pay envelopes on the next Wednesday you will find a slip giving the amount of extra pay you have each earned so far in December figuring on the piece-work rates we propose to use. If you agree to the piece-work plan, the money is yours for the asking. If not," he paused—because a pause here told more than any words he could choose—"if not," he went on slowly, "I shall feel that you have made a grave mistake."

He smiled, nodded, and descended to the floor, quickly passing from among the men, who broke up into groups. Plainly the new plan had stirred them all to the core. It meant to many of them the surrender of something which the usage of generations had made almost instinctive. More than that, it asked them to intrust their future welfare to the honesty of the group of men representing their employers. Small wonder some of them hesitated, lest they drop the substance for the shadow. Some of the more stubborn protested that the scheme was merely a blind, a roundabout way of cutting wages. Others more clear-sighted saw it in an earnest endeavor by the concern to do the "square deal."

However, Johnson had neither misjudged his adversaries nor spent his ammunition on the first onslaught. His last shot, the extra payslip in the envelopes, was too much of an argument for the most stubborn to withstand. Here was something definite, something they could all grasp. So that, when they sent a committee to tell Johnson of their acceptance, it was without the feeling that they would be stepping out into the dark, as it were.

Yet who can say what motives really led the men to put faith in Johnson. Perhaps they did it through blundering stupidity. Or perhaps, after all, it might have been that intangible force which lies in the calm eyes and white hairs of the aged, or which in a leader of men wins unquestioning devotion. Perhaps it was character.

New Tools and Appliances.

This is essentially a news department for which information is invited.

Double End Disk Grinder.—The Rowbottom Machine Company, Waterville, Conn., has recently brought out a new type of 10-in. ball bearing double-end disk grinder. The tables have a rocking motion across the face of the disk or if desired can be fastened in a fixed position. A vertical adjustment, an angular adjustment to the face of the disk and an adjustable gauge for any angle or square position on the horizontal plane are provided for the table. The construction of the spindle ball bearings is such that longitudinal movement due to changes in temperature is permitted, thus avoiding any possibility of damage due to binding. The same bearing takes the end thrust in either direction and the ball races can be changed to opposite spindle ends.

Curve Rule.—For drawing irregular curves of all descriptions, such as ellipses, parabolas, hyperbolas, gear teeth, screw threads, etc., the Designers' Rule Company, Chicago, Ill., is manufacturing a rule which can be easily adjusted to the desired form and retains it until changed by the operator. Five lengths of rule ranging from 3 to 18 in. are made.

Horizontal Cylinder Boring Machine.—A horizontal machine for simultaneously boring and facing steam, gas, pump and water cylinders, as well as for boring guides and facing the ends of engine frames, has been built by the Barrett Machine Tool Company, Meadville, Pa. The boring bar which is either 2½ or 3 in. in diameter, has a continuous feed in either direction of 30 in., so that it will bore out and face both ends of a cylinder of this length at one setting. The pedestals are 18 in. from the top of the bed to the center of the boring bar, and the tail pedestal is adjustable along the top of the bed from 0 up to 30 in. A quick change feed box renders six different feeds ranging from 1/32 to ⅜ in. per revolution of the boring bar available. The feed box is equipped with two facing arms of heavy construction mounted on the ends of the sleeve which are driven by friction and can be started and stopped at will. The regular equipment of the machine includes a four-step cone pulley with a corresponding pulley on the countershaft, which has two friction pulleys, thus providing eight speeds for the bar. If desired, the machine can be driven by an electric motor mounted upon a bracket bolted to the side of the frame.

Vertical Milling Attachment.—The G. R. Lang Company, Meadville, Pa., has recently placed on the market a new milling attachment in which the body of the device is held on the overhanging arm of the tool. The attachment is very rigid and will take a heavy cut, while if desired cutters can be mounted in both the milling machine spindle and that of the attachment.

Generator End Bells.—The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., is equipping all of its alternating current generators with sheet steel end bells. Sheet metal has been substituted for the castings formerly employed since it sets well around the machinery and is not apt to break. Another advantage of this new arrangement is that it is not necessary to carry a large number of types of bells in stock for the various designs of generators, which was the case where castings were used. The sheet steel bells are securely bolted to the frame at one end and are bound together to form a continuous circle at the other.

Portable Reamer and Drill.—The Cincinnati Electrical Tool Company, Cincinnati, Ohio, has recently placed on the market a new portable electric reaming and drilling machine which, while intended primarily for drilling and reaming structural work and bridge members, can be used wherever a portable tool is required. The gearing, which is entirely inclosed, runs in grease, and there is no chance for the lubricant to work into the armature winding. The control is through a quick-acting switch operated by a corrugated sleeve, which slides back and forth on one of the handles. A series wound motor is used, and is cooled by air, small holes being left in the frame for this purpose. Three sizes of tool are made, having a maximum capacity of ½, 1 and 1¼-in. diameter drills or reamers, and spindle speeds of 200, 350 and 500 r.p.m., respectively. All three sizes are provided with holes for Morse taper shanks and the two larger sizes have screw feed for the drill spindle. If desired, the smaller size can be provided with a chuck instead of a socket for the taper shank drills.

Pneumatic Chipper Hammer.—The Dayton Pneumatic Tool Company, Dayton, Ohio, has recently brought out a new hammer, which is intended especially for use in steel foundries, where the service is more severe than cast iron foundries. In general the construction follows the maker's standard line. These hammers are made in both the Dayton and Green types, the former having an outside trigger and the latter an inside one. The special features of the new hammer are a long plunger which gives more bearing and a greater wearing service and a poppet style of throttle valve, which is guided by but is not fastened to its stem.

Boring and Reaming Attachment for Cylinders.—The Garvin Machine Company, Spring and Varick streets, New York City, has recently brought out a boring, reaming and lapping attachment for automobile cylinders. The attachment is intended to be used with the company's No. 15 plain miller and consists of an adjustable boring head with three tools which is mounted on a special horizontal head bolted to the face of the miller and clamped to the steel arm. This has a heavy projecting spindle which is threaded on the forward end to receive the adjustable boring tool and the spring adjustable lapping tool. The regular table feed is used with the automatic trips and after the boring operation is completed the lapping tool, which is made in four sections so that emery cloth can be secured to it, follows. The necessary high speed for the lapping operation is secured by a two-speed countershaft although in many cases the boring operation gives a satisfactorily finished surface. The reverse speed to the machine allows the lap to travel under power feed in both directions and the adjustment at the knee enables the consecutive cylinder holes to be located readily.

Grinder for Straight and Spiral Cutters and Mills.—The Northampton Emery Wheel Company, Leeds, Mass., has recently placed on the market a machine that is intended particularly for grinding side and face cutters. The capacity of the machine is 4 x 2½ in. and it is arranged with an adjustable rest connected to the slide which holds the cutter while the latter is being ground. This slide has an adjustable stop on the rear to regulate the amount of grinding and is gibbed to take up wear. The face grinding attachment can be tilted to any desired angle and is arranged with an adjustable stop on the slide. The mill is held in position by a plunger operated by a spring which locks it into the teeth of the mill thus holding the latter perfectly rigid while it is being ground.

Collapsible Tap.—F. W. White, superintendent of the William H. Page Boiler Company, Meadville, Pa., has recently designed a collapsible tap having no projecting levers or trips and one in which the chasers are not actuated by springs. The opening and closing of the tap is controlled by a knurled collar and when used in an automatic machine it is entirely automatic in action.

An Improved Twist Drill.—A patent has been recently granted to J. L. Osgood, 121 Erie County Bank Building, Buffalo, N. Y., covering a new type of twist drill in which the tool is made by twisting a flat steel bar. A special type of shank is used with the drill.

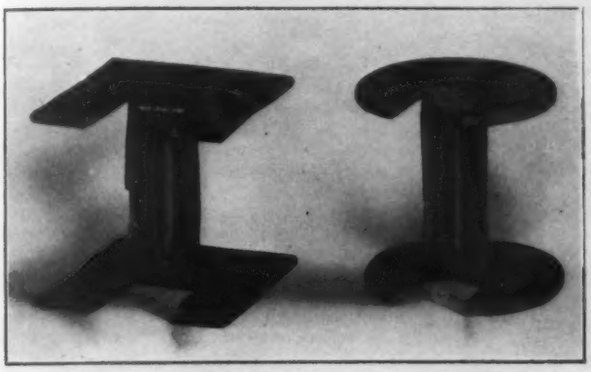
A New Ventilator.—The Swinging Top Ventilator Company, Lewisburg, Pa., has brought out a new type of ventilator with a copper top and a brass ball bearing which is said to embody in its construction all the good points of the stationary and revolving ventilators, while costing considerably less. In its normal position the gases are able to escape from the flue readily and when the wind strikes it the windward side closes at once and the gases escape from the leeward side. As soon as the wind ceases the ventilator returns to its normal position.

The Turner-Fricke Mfg. Company, Pittsburgh, builder of gas engines, making a specialty of those for direct connection to generators, where close speed regulation is necessary, has the following contracts in hand: South Side Electric & Mfg. Company, Pittsburgh, two 200 hp.; Fried & Reineman, Pittsburgh, one 150 hp.; Avondale Ice Company, Cincinnati, Ohio, one 150 hp.; Keystone Hair Insulating Company, Pittsburgh, one 60 hp.; Furnas Ice Cream Company, Columbus, Ohio, one 150 hp. The company is finding a growing field in the line of ice and refrigeration, its engines being adapted to the constant duty service.

The McCarroll Ideal Chaplet

The McCarroll patent chaplet, shown in two styles in the illustrations, differs from others in the fact that it is manufactured in one piece. The maker, the Ideal Chaplet Works, 3336-3338 Market street, Philadelphia, sought in perfecting the design to overcome a trouble sometimes experienced in three-piece chaplets, of the heads becoming loose or falling off when being set to suit the core, and also of the falling off of the stem when chipping or machining castings.

The one-piece chaplet is made of heavy sheet steel of special grade, the heads, which may be either square or round, being pressed into form and therefore always parallel and of accurate size. The metal from the slot in the heads forms the stem, the compression strength of which is materially increased by a corrugation through



The McCarroll Ideal Chaplet.

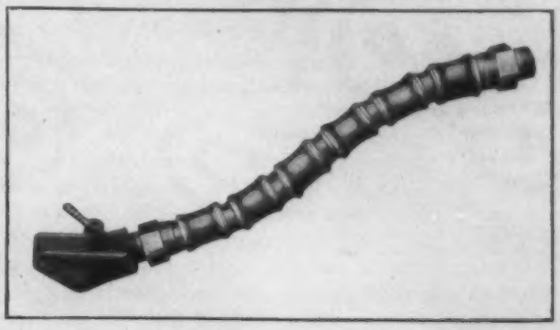
almost its entire length, giving an additional holding surface on the sand and thereby preventing washing from position in the mold. The nature of the metal enables it to be bent to any desired position without breakage. Another important feature is the method employed in coating the chaplets with tin, which obviates any hiding of loose stem troubles. The manufacturers after considerable experimenting adopted the electrolytic process, in using which it is absolutely necessary that the material be chemically clean. Therefore no rust or grease could remain between the steel and the coating. The pure tin oxidizes when it comes in contact with fluid iron and steel, leaving little or no residue, and insuring a tight joint when the metal shrinks around the chaplet, if the body of the metal is not heavy enough to cause a fusion. The chaplets are made in standard sizes ranging from ½ in. to 3 in., with special sizes to order.

An 18-lb. crankshaft for use with a four-cylinder 50-hp. engine for an aeroplane tells an interesting story of a late accomplishment with chrome vanadium steel. The metal, known as Scott's Unique alloy steel, was furnished by the Bourne-Fuller Company, Cleveland, and was forged into a solid shaft under a steam hammer, rough turned and heat treated in the regular way. It was then finished and the center bored out. In the rough state, each shaft, of which there were three altogether, for three Hadley & Blood Farnam type biplanes, weighed 82 lb. After being completely finished they weighed, as stated, 18 lb. each. The crankshaft really comprised a tubular shell ⅛ in. in thickness and tests, it is explained, developed a margin of safety of 38 per cent. over that necessary for the 50-hp. engine, working with an explosion pressure on the piston head of 1100 lb. per square inch.

The Bureau of Statistics of Massachusetts has issued in pamphlet form a memorial to Carroll Davidson Wright, the late president of Clark College, Worcester, Mass., and formerly Commissioner of Labor of the United States. The material was prepared by Horace G. Wadlin, librarian of the Boston Public Library and chief of the Massachusetts Bureau of Statistics of Labor. The life of President Wright was closely identified with the great question of American labor and the voluminous sketch contains much that will interest its readers apart from the personal side of the distinguished publicist.

The Corona Flexible Metallic Hose

The flexible metallic hose shown in the accompanying illustration is made by the Corona Mfg. & Supply Company, 311 Atlantic avenue, Boston, Mass., and is intended



The Corona Flexible Metallic Hose, Made by the Corona Mfg. & Supply Company, Boston, Mass.

especially for use between locomotives and their tenders and between cars in pass service. The hose is made up of a series of joints held in position by a specially designed, close-wound steel wire spring, thus securing tightness of joints as well as sufficient flexibility of hose. The spring pressure also tends to take up any wear which may develop between joints through excessive action of hose while in service. In case of breakages new parts can be applied. The hose is not subject to change through heat, and, therefore, maintains a constant area for the passage of steam.

Two-Stage Gas-Driven Air Compressor

A remarkably compact and unusually interesting combined air compressor and gas engine has been designed by C. E. Sargent, M. E., 136 West Lake street, Chicago, in which the annular space around the piston of a vertical gas engine is used for compressing the air. In short, there is one piston, one connecting rod and one crankshaft for both the gas engine and the compressor. The gas engine part of the combination is of the usual four-stroke-cycle type, but there is an amount of work done in air compression on every stroke of the piston. On the up stroke of the piston air is drawn into the crank case; on the next down stroke, air is compressed in the crank case and is forced through a valve into an annular chamber surrounding the piston; on the third or next up stroke the air is forced from this annular space to the storage tank or receiver for the air and of course during this stroke the crank case is again being filled. From indicator diagrams taken on the compressor, it is found that the air is compressed in the crank case to an absolute pressure of 21 lb. at the time when compression begins in the second stage.

With regard to the thermal efficiency it is emphasized that there is a large amount of surface surrounded by the cold jacket cooling water, and a short distance for the heat to travel so far as the annular space of compression is concerned. With regard to the mechanical efficiency the point is mentioned that the pressure is always down, and that a clearance of 1/100 in. for the piston is easily satisfactory. Discharge pressures for the air of 60 to 140 lb. are shown by the test indicator diagrams. An inertia governor is employed and gas, gasoline or kerosene may be used for fuel.

An official of the Baldwin Locomotive Works, Philadelphia, states that the company has never recognized the attempt of organized labor to obtain recognition and that it has not been nor is it now inconvenienced by any shortage of employees. At the time the greatest number of men was idle its requirements, owing to the small amount of orders on hand, were fully taken care of with the reduced force. The number of employees in the various departments of the plant is now given as 9200, which is all that can be handled; in fact, in some departments, where orders are being cleaned up, a decrease in working hours is contemplated. New business is still reported to be extremely light and is expected to continue so during the coming month.

The Machinery Markets

The automobile industry continues to contribute good support to the machinery markets. An unusual number of new prospects have come forward in the New York market, particularly in the motor truck industry. In Cleveland about $25,000 worth of equipment for automobile plants has been closed and good sales have been made to the automobile trade in Detroit, principally for replacements. The Chicago market is more active and the International Harvester Company continues a good customer there, having bought $20,000 worth of machinery for its Tractor shops. The Chicago & Alton Railroad is expected to place orders soon for about $14,000 worth of tools and a small list has been closed by a local printing concern. Domestic business is dull in Cincinnati, although there is a steady run of export trade. The demand for irrigating machinery is on the increase in Texas and the expectation of good crops is giving much encouragement. On the Pacific Coast the bulk of the business is for small tools for immediate delivery, but some good orders have been placed for heavy metal-working machinery. The mining machinery demand is improving in that market. Trade is better in the South, where contractors' equipment and power machinery are in good demand. In Philadelphia the buying is largely for single tools, and in New England the principal interest is centered on the export demand which is lending support to the market.

New York

NEW YORK, July 26, 1911.

A number of motor car manufacturers in this vicinity are preparing to buy equipment and several new enterprises in that line, especially in the industrial field, have come forward. Outside of a call from the automobile trade the machinery demand is not so active, although some good orders were recorded during the week for small groups of tools, principally for replacement. While new inquiries were not so plentiful, machine tool salesmen who followed up enterprises on which buying has been deferred, because of the general dullness, have been given better encouragement and there are indications that some of these requirements will be closed out in the near future. The New York Central has bought little, if anything, against the list it has out, but assurance has been given in some quarters that orders will be placed very shortly. The machinery demand is spotty. Manufacturers of contractors' equipment are doing a big business, and some excellent sales of hoisting engines and power plants for outdoor use have been made, while on the other hand the call for Corliss engines is not very good. Manufacturers of electrical units are doing a normal business and makers of wood-working machinery have nothing to complain of.

Among the machine tool makers there is a good call for some machines, principally in the line of small tools, while makers of heavy metal-working equipment find business dull. The jobbing foundries, as a rule, are not so busy as they were two weeks ago.

It appears that the requirements of the Delaware & Hudson Railroad Company for its proposed new shops at Watervliet, N. Y., will not come before the trade as soon as had been expected. Work of building the $2,000,000 shops at that point is not progressing very rapidly and a number of machine tool men have been assured that the buying of metal-working machinery for the shops will not be done until winter sets in, at the earliest. It is understood that the power needs of the new plant are to be attended to first. According to the present plans the company will build a locomotive repair shop, 275 x 300 ft., a blacksmith shop, 100 x 300 ft., and a large boiler and tank shop and wood-working shop, a 35-stall roundhouse, a general storehouse and an administration building.

The Windsor Machine Company, Windsor, Vt., manufacturer of the Gridley automatics, has appointed as its Western sales manager H. W. Wells, who for a number of years was purchasing agent for the International Harvester Company. The company's line was previously handled in the Western territory through Manning, Maxwell & Moore, Inc., who were the exclusive agents. Mr. Wells will have with him several sales representatives. He is very well known to the machinery trade throughout the country, as he has purchased some of the largest installations in mechanical equipment ever bought in this country, including those for the foreign plants of the International Harvester Company at Lubertzy, Russia; Norchippening, Sweden; Croix, Germany; Norde, France; Akron, Ohio, and Tractor Works, Chicago.

Plans are nearly completed for a large plant to be erected in Phillipsburg, N. J., adjacent to the works of the Ingersoll-Rand Company, which will be occupied by the A. S. Cameron Steam Pump Works, now at 433 East Twenty-third street, New York. On the completion of the plant the mechanical equipment will be purchased so as to make the new plant about double the size of the present Cameron works. It is the intention of the Ingersoll-Rand Company to add other lines of pumping equipment to those now manufactured at the New York works.

The Tubes Realty Company, 316 Fifth avenue, New York, has filed plans for the erection of a storage warehouse building to be erected in Long Island City, at a cost of $600,000. The building will occupy one city block, and will be six stories. In addition to requiring a large amount of power equipment some heavy freight elevators and pumping machinery will be installed.

The Twombly Motors Company, 220 East Fifty-first street, New York, has about decided to locate its proposed new plant in New England, either at Bridgeport or Hartford, Conn. The company is planning to make a specialty of building a small delivery wagon, but it has patterns for other types of cars.

J. M. Lansden, Jr., who until recently was connected with the Lansden Truck Company, Newark, N. J., has opened an office at Orange and Broad streets, Newark, and is arranging to manufacture a new automobile truck of an improved type. The plant will probably be located in Newark and the machinery details are now being discussed.

The Acme Motor Company, Reading, Pa., which has been a good customer of machine tools in the New York market of late, is planning to make additional expenditures for metal-working machinery. The company has a large plant at Reading, and has ample room to add additional manufacturing equipment.

William Bal, Inc., is preparing to erect a two-story brick factory, 100 x 122 ft., on the southwest corner of Vesey street and New Jersey Railroad avenue, Newark, N. J. The company will not install any new machinery excepting a freight elevator.

The Olean Electric Light & Power Company, Olean, N. Y., has plans for the construction and equipment of an electric power station at Sears, and the building of high-tension transmission lines to Olean and other centers. The company has filed application with the Public Service Commission for permission to issue bonds to the amount of $85,000 for this purpose.

Lieut.-Col. W. W. Gibson, commanding officer of the Watervliet Arsenal, Watervliet, N. Y., is receiving bids for a large addition to be made to the gun shop.

Martin Bros., Norwood, N. Y., are having plans prepared for a pulp mill, 60 x 100 ft., one and a half stories, with a concrete flume, 60 x 200 ft., which they will build this summer.

The Central Casket Company, Buffalo, now located at Chicago and Ohio streets, has completed plans for a two-story factory building, 85 x 150 ft., to be erected at Manitoba street and Baitz avenue, with switching facilities from the Erie Railroad.

The J. Spaulding & Sons Company, manufacturer of pulp board and hard fiber materials, Manchester, N. H., has let the contract for the construction of a plant to be located at Tonawanda, N. Y., on the New York Central Railroad. The main building will be 265 x 300 ft., one and two stories, of reinforced concrete. The plant will also include a machine shop, 36 x 144 ft., one story, an acid-boiling building, 36 x 72 ft., and a power house.

The West End Paper Company, Carthage, N. Y., is having surveys made and plans prepared for the construction of a concrete dam for water power development.

The contract for the construction of a power house,

THE MACHINERY MARKETS

60 x 90 ft., four stories, for the East Creek Light & Power Company, East Creek, N. Y., has been awarded to Brown & Lowe, Schenectady, N. Y.

The extensive new plant of the National Carbon Company, now building at Niagara Falls, N. Y., which will have a floor space of nearly four acres, is rapidly approaching completion. It is expected it will be ready for operation about Sept. 1.

The Phoenix Die Casting Company, Buffalo, N. Y., has been incorporated with a capital stock of $15,000 to manufacture dies, die castings, etc. Henry Bechter, 326 Hudson street, is president.

The village of Wellsville, N. Y., is having plans prepared for a water work and distributing system estimated to cost about $200,000. Engineer Charles C. Hopkins, 343 Cutler Building, Rochester, N. Y., has the matter in charge.

New England

BOSTON, July 25, 1911.

The demand for machinery experiences little change and the market is without special feature. Export business continues to occupy an important place in business. Machine tool builders who have recently returned from Europe report that conditions there are excellent as they effect the industry. One manufacturer, who has recently visited England, France, Belgium and Germany, found the outlook bright practically everywhere. The drought continues to exert a somewhat important influence in this section. Water power is rapidly failing and mills having no auxiliary steam power are suffering accordingly. As is always the case when this condition exists interest in steam power on the part of the mill owners increases visibly and doubtless considerable buying of power equipment will eventually result from the present lack of rain.

A new New York corporation, the McCue Company, has been organized with a paid in capital stock of $700,000 to take over the business of the McCue Company, of Hartford, Conn., and the Superior Axle & Forge Company, Buffalo, N. Y., manufacturer of automobile axles and transmissions. C. T. McCue is president and general manager of the combined business. It is stated that the company will operate both works, that at Buffalo taking care of the Western trade. The McCue Company was organized as a Connecticut corporation in 1904 and has built up an extensive business. The Superior Axle & Forge Company began operations last January. It is one of the best equipped axle works in the country and has a large drop-forging plant. The directors of the company are J. W. Lansing, H. H. Bean, Ira T. Gleason and H. A. Kamman, all of Buffalo, and C. T. McCue, of Hartford. Mr. Lansing is the vice-president. Mr. McCue will make his residence in Buffalo. The company begins business with orders for 1912 totaling over $800,000.

The business of Scott & Williams, Inc., Philadelphia and Boston, manufacturers of knitting machinery, and of the Geo. D. Mayo Machine Company, Laconia, N. H., manufacturers of seamless hosiery machinery, have been consolidated. Both plants will be operated as heretofore, but the selling and plant management will be centralized. This change has been accomplished by the purchase by Scott & Williams, Inc., of a large interest in the Mayo company and a purchase by the Mayo company of an interest in the other corporation. Robert W. Scott, president of Scott & Williams, Inc., is now the president and Philip M. Reynolds is treasurer of the Geo. D. Mayo Machine Company. The official statement is made that both companies will be maintained and both plants will be enlarged and improved as business may warrant it.

Giron Frères, manufacturers of velvet ribbons at St. Etienne, France, have decided to build a large mill at Norwich, Conn., where land has been purchased for the purpose. Other additions to manufacturing industries include a brick building 68 x 80 ft., three stories, for the Berkshire Woolen Company, Pittsfield, Mass., and an addition 40 x 48 ft., three stories, for the Crane Bay State Mill in Craneville, Mass.

The McNab Company, Bridgeport, Conn., which has recently taken over the assets of the McNab Indicator Company, will not establish a factory for the present, its product being manufactured by the Automatic Machine Company, of that city.

The contract has been awarded for the new factory of the Artistic Bronze Company, Fairfield avenue, Bridgeport, Conn. The main building will be 30 x 100 ft., one story, the boiler house 22 x 35 ft., and there will be several smaller structures. The company will remove its plant from Norwalk, Conn.

The Pawtucket Foundry Company, Pawtucket, R. I., has filed a voluntary petition in bankruptcy, and Wm. H. Thornley has been apointed temporary receiver.

John R. Graham, Bangor, Me., president of the Bangor Railway & Electric Company, has purchased, according to a despatch from Bangor, the hydro-electric plant of the Bodwell Water Power Company on the Penobscot River at Old Town and Millford and will carry out extensive plans for increasing the power. The present plant was constructed some years ago at a cost of $1,000,000. The increased power will be obtained by the construction of a dam across the Stillwater branch of the Penobscot.

Irving H. Page has relinquished the managing control of the business of the Stevens-Duryea Automobile Company, Chicopee Falls, Mass. He has resigned the office of president, but will continue to serve as treasurer. The management of the business has been assumed by W. H. Whiteside, Chicago. Mr. Page will devote his attention more particularly to the J. Stevens Arms & Tool Company, of which he is president and treasurer.

The Gilbert & Barker Mfg. Company, Springfield, Mass., which is preparing for the establishment of a large factory for the building of gas manufacturing equipment, states that its plans are not ready for any detailed statement, no final decisions having been reached.

The Atwater Mfg. Company, Southington, Conn., manufacturer of hardware and forgings, has filled the vacancy caused by the death of President Norman A. Barnes by the election of Alfred M. Smith to that office. Mr. Smith has been secretary and treasurer of the corporation and will continue to hold the latter office. Bradley H. Barnes continues as vice-president. John Hemingway was elected secretary and James H. Pratt, formerly president of the company, was made a director to succeed Mr. Barnes. The board now consists of Mr. Smith, Mr. Barnes, Mr. Hemingway, Mr. Pratt and Leo Davis. The affairs of the company are in a very prosperous condition. During the year many improvements have been made, including the installation of a new boiler and engine and considerable machinery. The company is now planning to install a system for the use of oil as fuel to take the place of anthracite coal in forging.

Philadelphia

PHILADELPHIA, PA., July 26, 1911.

Reports from both merchants and manufacturers indicate that business is still very irregular. There has been little fresh inquiry and the demand has been confined almost entirely to single tools; in several instances, however, requirements appear to be along the heavier lines. The vacation period has had considerable influence on pending negotiations and prospective orders are frequently held up on this account. Industrial concerns, while slightly more actively engaged, particularly in finished steel lines, have not reached the point where additional equipment is being considered; for the most part the present tool equipment is not yet fully engaged. Railroad buying continues very light. Some fair business is under negotiation in power-plant equipment, but even in these lines there is the usual hesitancy shown in the final placing of orders. The second-hand boiler, engine and machine tool equipment market shows but little movement. The demand is irregular and but few orders for tools have come out.

The foundry trade is dull. Steel casting plants are operating on a basis of 30 to 50 per cent. and are largely dependent on week to week orders. The absence of railroad and heavy machinery business is being keenly felt. Gray iron foundries are also operating irregularly. Some of the smaller plants are pretty well engaged, but in the larger foundries, particularly those depending to some extent on the machinery trade, operations are usually at a rate considerably under normal.

The Pennsylvania Railroad has an inquiry before the trade for a small grinding machine.

The Pennsylvania Equipment Company, West End Building, is in the market for a second-hand mold board plow, left-hand side, to plow off Hart cars; also for iron or steel turntables to handle locomotives 55 ft. long and 50-tons weight.

THE MACHINERY MARKETS

The Southwark Foundry & Machine Company has recently booked orders for equipment of the new steel plant of the Laclede Steel Company, St. Louis, Mo., including one 34 x 48-in. Corliss engine, with a complement of four rope drive wheels and a Weiss condenser plant. This concern has been booking a fair amount of general engine and condenser orders in the past few months, but notes that pending business has not closed so freely during the past month.

The Chester Engineering & Machine Company, Chester, Pa., which makes a specialty of gasoline engines for automobile and marine service, is extremely busy in every department. In addition to a large number of orders for its own line of Penn motors it has recently made a contract with the American Locomotive Company to build a large number of that company's motors for Alco automobiles.

Contracts have been announced by the government under which the New York Shipbuilding Company, Camden, N. J., will build two sea-going tugs to cost $194,000 each.

Plans have been filed with the Bureau of Building Inspection for the new plant to be erected for the Adams & Westlake Company, at Twenty-second and Ontario streets, previously mentioned. The building will be about 105 x 149 ft., three stories.

The Empire Grate Company, Chester, Pa., is operating to its full capacity. In addition to its regular line of grates, the company is doing a large amount of work in general and machine castings. Plans recently referred to regarding the removal of this plant to larger quarters have not fully matured.

The Pennsylvania State Commission to erect a State Hospital for the Criminal Insane at Fairview, Pa., will receive proposals at its office in the Real Estate Trust Building, this city, until August 8, for the construction of new buildings known as dining room, kitchen, bakery and laundry buildings, power plant, ice house, reservoir, sewage disposal and equipment for the various buildings and power plant. Drawings, specifications and blank forms may be had from the architect, C. M. Shirk, 518 Philadelphia Bank Building, this city, on making a deposit of $200, of which $180 will be refunded on return of the drawings.

The Lanston Monotype Machine Company is asking for estimates on its proposed new plant to be erected on Locust street, between Twenty-fourth and Twenty-fifth streets. Plans provide for a six-story building of fireproof construction, 268 ft. on Locust street and 176 ft. on Twenty-fourth and Twenty-fifth streets. The matter of power equipment for the new plant is now under consideration, while that referring to probable additional machinery and tool equipment will not be taken up until a later date.

The Universal Sanitary Mfg. Company, New Castle, Pa., manufacturer of closets, tanks and other plumbers' specialties, suffered the loss of its plant, consisting of several brick buildings, with the stock on hand, by fire July 22. The plant was only partially insured.

Cleveland

CLEVELAND, OHIO, July 25, 1911.

The slight improvement noted in the local machine tool market during the past few weeks continues. Dealers report a moderate volume of scattering orders, largely for single tools. While little change is looked for during August it is generally believed that the market will become more active in the fall. The Michigan automobile concerns that recently came in the market for considerable equipment for extensions have made their purchases and Cleveland dealers took a share of the business, the largest order placed here amounting to about $25,000. Some business in lots of several tools has also come from automobile manufacturers in Ohio. According to announced plans for factory extensions some other automobile builders in the Central West will buy considerable machinery during the next two or three months. The outlook for the automobile and motor truck industry during the coming year is now regarded as very promising. The rubber industry continues to furnish a fair volume of single tool business. The demand for second-hand tools is only moderate and dealers' stocks of used tools have increased somewhat during the past few weeks. Lists for railroad requirements are still being held up and practically no business is coming from that source in this territory. The demand for steam engines and boilers is quite good, especially for large installations. One local selling agency reports that its sales in these lines during the first half of the year were 20 per cent. larger than during the corresponding period of 1910.

In the foundry trade the demand for both iron and steel castings continues light.

The Lake Erie Nail & Supply Company, 412 Frankfort avenue, Cleveland, in addition to its line of heavy hardware, mill and factory supplies, will hereafter handle iron and woodworking machinery. A line of the latter will be carried in stock. The machinery department after August 1 will be in charge of S. W. Sparks, who has been connected with the Osborne & Sexton Machinery Company, Columbus, Ohio.

The Adams-Bagnall-Bagnall Electric Company, Cleveland, has commenced the erection of a modern factory building on its present site. A six-story structure of brick, steel and cement construction is being erected that will provide 65,000 sq. ft. of floor space. The company does not expect to need any new machinery equipment.

The Board of Trustees of the Athens State Hospital, Athens, Ohio, will receive bids care the Osborn Engineering Company, 20 East Broad street, Columbus, Ohio, August 10, for two 125-hp. horizontal tubular boilers complete, including breeching and steam piping, and one horizontal steam-driven air compressor with steam and air pipe connections, one air receiver and two air lift wells with piping and other equipment.

The Aluminum Foundry Company, Sebring, Ohio, has been incorporated with a capital stock of $20,000 by Fred Baugh and others. Mr. Baugh is at present operating a foundry in Alliance, Ohio. The new company will build a foundry building 50 x 150 ft. for the manufacture of aluminum castings exclusively.

The Lauth-Juergens Motor Car Company, Fremont, Ohio, is planning the building of an addition to its plant during the coming fall.

The Thompson Hanger Works, A. J. Thompson, proprietor, now located at 337 Superior avenue, N. W., Cleveland, will equip a plant for the manufacture of an electric cut-out hanger for arc lamps. A drill press, grinder and a small amount of other equipment will be needed for assembling work.

The Forest City Electric Company, Windsor avenue, Cleveland, is erecting a repair shop to replace one recently destroyed by fire.

The purchase of the machinery equipment for the new West Side Technical high school, Cleveland, which has been delayed longer than expected, will be made shortly by the Board of Education. The list, which was published in *The Iron Age*, May 25, consists of about 100 tools, including machine shop, forge shop, pattern making and cabinet shop and foundry equipment. Specifications have been completed and bids will be received in about four weeks.

The Economy Stove Company, Scranton road, Cleveland, which has been doing business as a partnership, has been incorporated with a capital stock of $100,000 by Frank A. Nieberding and others. Plans will be made for increasing its output.

The Cleveland Trolley Wheel Company, Cleveland, has been incorporated with a capital stock of $50,000 by E. E. Beam, L. S. McAdams, C. H. Hartley, W. H. Thompson and others.

The Maddock Textile Company, Milford Center, Ohio, will build a new plant to replace one recently destroyed by fire.

The Bay View Foundry Company, Sandusky, Ohio, has increased its capital stock from $40,000 to $75,000.

Cincinnati

CINCINNATI, OHIO, July 25, 1911.

The usual vacation period has been extended this year and manufacturers generally are taking advantage of the present lull to get their plants in good shape for fall business. A bright spot with the machine-tool builders is the export trade, and there does not seem to be any material let-up in the number of orders that have been coming in freely for the past three months. The majority of the machine-tool shops are operating on curtailed time, and in spite of this a few of them continue accumulating stocks. However, there is a generally optimistic feeling and it is thought that September will see a decided turn for the better in the domestic trade.

The superintendents and foremen of the different shops in Oakley, a Cincinnati suburb, have organized under the name of the Superintendents' and Foremen's Club, of Oakley, Ohio. On July 20 a dinner was served at Weber's café, at which time the organization was

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perfected and the following officers were elected: President, William H. Shaffer, superintendent and treasurer Cincinnati Bickford Tool Company; vice-president, H. M. Ramp, superintendent Modern Foundry Company; treasurer, S. E. Weir, superintendent Triumph Electric Company. The following comprise the board of governors: William Baretis, general foreman Cincinnati Bickford Tool Company; Charles W. Moon, general foreman Triumph Electric Company; Charles Herider, foreman Cincinnati Milling Machine Company; William J. Eggebrecht, foreman Cincinnati Planer Company, and William Raeder, foreman Modern Foundry Company. In addition to social features it is planned to have a number of lectures on current shop topics at the club meetings during the coming winter.

The Eureka Foundry Company, one of Cincinnati's oldest foundries, filed a voluntary petition in bankruptcy last week. The estimated assets are $125,000 and the liabilities are only $75,000. It is claimed that the company is entirely solvent, but on account of the present business recession it is not able to meet pressing obligations without having to dispose of its property at ruinous prices. William H. Merten, president of the company, has qualified as receiver and will operate the plant as heretofore.

Sealed proposals will be received by the board of trustees of the Athens State Hospital, care the Osborn Engineering Company, Columbus, Ohio, until August 10, for the following: Two 125-hp. horizontal tubular boilers, complete, including breeching; one horizontal steam-driven air compressor, complete with all steam and air-pipe connections; one air receiver; two air-lift wells, complete with all piping; concrete cisterns, etc. Specifications may be seen at the engineer's office in Columbus and at the superintendent's office, Athens State Hospital, Athens, Ohio.

The superintendents of the local machine shops visited the University of Cincinnati July 20 for the purpose of inspecting the new power plant and engineering building. Some interesting tests of machine tools were made and at an informal meeting afterward it was decided that each shop superintendent should visit the Cincinnati Continuation School once each month and deliver a short talk on some shop topic.

The Tool Steel Gear & Pinion Company, Cincinnati, is installing additional equipment in its plant in Carthage suburb. It has lately added rolled gears to its line, made from rolled blanks furnished by the Carnegie Steel Company. In addition to its excellent domestic business the company is shipping a large number of its gears to foreign street-car lines.

The Standard Steel Bottling Machine Company has been incorporated at Parkersburg, W. Va., with $6,000 capital stock. J. T. Calahan and H. B. Hogg are named among the incorporators. The company's plans have not yet been given out.

Work has commenced on the large glass plant of the Wheeling Tumbler Company, at Wheeling, W. Va.

The Mosler Safe Company, Hamilton, Ohio, has let contract for an extensive addition to its pattern shop.

The Bay View Foundry Company, Sandusky, Ohio, has increased its capital stock from $40,000 to $75,000.

Chicago

CHICAGO, ILL., July 25, 1911.

In contrast to the first two weeks of July, the past several days have been productive of some interesting business in machinery lines. The International Harvester Company, for the addition to its Tractor Works machine shop, bought machines totaling in value about $20,000. About half of this amount was placed with one Chicago dealer and in the neighborhood of $6,000 with another. A local printing concern purchased tools to the amount of $5,000. Among the machines in these two orders were five Bullard vertical turret lathes—four 36-in. and one 42-in. The Chicago & Alton Railroad expects to buy for its Bloomington shops about $14,000 worth of tools, including 36-in. x 10-ft. and 24-in. x 6-ft. lathes, 42-in. boring and turning mill, a 48 in. x 48 in. x 12-ft. planer and a 6-ft. plain radial drill, all to be motor-driven. During the convention of the American Railway Tool Foremen, to be held in Chicago this week, special demonstrations of its complete line of tools will be given at the store of the Marshall & Huschart Machinery Company, 17 South Jefferson street. This company's store is especially well equipped to display the merits of machinery in actual operation, and on this occasion factory representatives will be present to demonstrate thoroughly features of advantage. It is stated that 7000 invitations have been issued.

Floor sales in the past week have shown improvement in volume, and the scattering business made up of sales of individual tools has been more satisfactory. On some attractive orders it is reported that the temptation to shade prices has not been entirely resisted, this weakness extending even to the manufacturers. The manufacturers of machine tools are operating very generally at less than the normal rate, with builders of milling machines favored somewhat above the others.

The sale of second-hand electrical equipment is steadily growing. Time was when a used dynamo or motor was considered in the same light with a second-hand boiler—an article as uncertain as a lottery ticket. The thoroughly reliable overhauling which is now assured to the buyer of used electrical power equipment by the several concerns who are specializing in this direction is changing the situation. One may now buy such motors or generators with the same confidence as obtains in the purchase of second-hand machine tools.

The American Brake Shoe & Foundry Company is now building on the 10-acre tract recently purchased at Twenty-sixth street and South Forty-sixth avenue what will be its largest Chicago plant for manufacturing brake shoes. It will be recalled that this company formerly made brake shoes at its Chicago Heights plant, but with the development of the manganese steel operations there and subsequent sale of that plant to the Edgar Allen Manganese Steel Company its brake-shoe capacity was limited to the Maywood plant which was acquired from the Featherstone Foundry & Machine Company. At the Burnside plant of this company only castings of more general character are made.

The National Steel Tank & Mfg. Company has been incorporated with $25,000 capital stock and will build a factory at Bradford, Ill., for the manufacture of steel tanks. This company will succeed the National Steel Tank Company, Pekin, Ill. The incorporators are H. L. Ruhaak and R. D. Lackman, of Pekin, and Joseph F. Cody and Edward M. Cody, of Peoria.

The Schneider Sales Company, Chicago, was incorporated with a capital stock of $2,500 to manufacture and deal in tools, machinery and appliances. The incorporators are Caspar J. Schneider, Lester E. Lee and Sidney E. Levy.

Curtis Brick Company, Grant Park, Ill., with a capital stock of $500,000, has been incorporated by Edward C. Curtis, Bernon C. Curtis and Ernest B. Griffin to manufacture and deal in brick, tile and terra cotta.

The Clyde Machine Works, Thirty-ninth and Union streets, Chicago, is in the market for a screw-cutting bench lathe 9 in. or over.

Oelrick & Berry, Larrabee street, Chicago, Ill., machinists and type founders, are building a four-story addition to their plant.

The Winthrop Asphalt Shingle Company has arranged for a building site at Clearing, Ill., and will build a factory there.

The Rumely-Wachs Machinery Company, 121 North Jefferson street, Chicago, is now permanently organized with the following officers: President, William N. Rumely, of the M. Rumely Company, La Porte, Ind.; vice-president, Charles L. Wachs; treasurer, O. A. Wachs; secretary, E. H. Wachs, Jr. S. E. Harvey is the newly appointed sales manager. A long term lease on the premises formerly occupied by McDowell, Stocker & Co. has been secured.

The Metal Workers Company, Chicago, has been incorporated with a capital stock of $10,000 to manufacture and deal in machinery and tools. The incorporators are Albert Nathan, Robert E. Fouz and Charles E. Stifft.

The Bi-Town Brush Company has prepared plans for and is about to erect at Aurora, Ill., a factory building 100 x 200 ft., the new construction to cost $25,000.

The city of Benson, Neb., has voted a $25,000 bond issue to provide for the building of a new water-works plant. Communications should be addressed to the Mayor.

A new ice plant to cost $100,000 is to be erected at Muskogee, Okla., by G. F. Bucher.

The New Sharon Motor Company, New Sharon, Iowa, is preparing to erect an addition to its plant.

The American Equipment Company, Indianapolis, has been incorporated with $50,000 capital stock, to manufacture fire protection apparatus. The directors are H. S. Byrkit, W. F. Roembke and M. C. Spearing.

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The Railway & Automobile Grease Cup Company has been organized at Terre Haute, Ind., with $5,000 capital stock, to manufacture automatic, dust-proof grease cups. The directors are G. J. Thomson, R. R. Armstrong and O. L. Brown.

The Hoosier Refrigerator Company, Peru, Ind., has been incorporated with $50,000 capital stock to manufacture refrigerators. The directors are W. S. Pond, H. F. Ader and W. A. Tucker.

The Forse Mfg. Company, Pendleton, Ind., has been incorporated with $26,000 capital stock to manufacture mechanical devices. The directors are W. H. Forse, Jr., R. M. Allen and Linfield Myers.

The Crescent Trunk Company has been incorporated at Evansville, Ind., with $10,000 capital stock, to manufacture trunks. The directors are Edward C. Kinkel, H. C. Becker and A. C. Hedderic.

J. J. Higgins, Clinton, Ind., and O. Martin, of Rosedale, Ind., have bought coal lands eight miles west of Clinton and have let the contract for the sinking of a shaft.

The Onyx Mining Company has been organized and incorporated at Martinsville, Ind., with $50,000 capital stock. The directors are Curtis A. Teague, Thomas A. and George R. Hudson, all of Hendricksville, Ind., near which an onyx deposit has been found.

The Anderson Cheese Cutter Company has been incorporated at Anderson, Ind., with $10,000 capital stock, to manufacture cheese cutters. The directors are E. F. Searle, F. M. Wilson and S. H. Searle.

Detroit

DETROIT, MICH., July 25, 1911.

Conditions in the local machinery market are practically the same as last week. Sales if anything are fewer, although some dealers report a fair demand. Outside of the automobile trade orders seem to be mostly for necessary replacement and not a great deal of improvement is looked for until fall business opens up. The demand for small tools has noticeably improved over last week and business in this line bids fair to continue brisk. Dealers in pneumatic tools report a cheerful feeling, but the volume of orders is not large at present. More activity is noted through the small industrial centers of the State than in Detroit, as there are numerous new companies coming into the market.

Building conditions are not quite so active this week and little new work is being figured on just at present, although awards were made on some factory additions and other structures which will call for iron work.

The large new factory of the Seitz Automobile Transmission Company is practically completed. The plant is 60 x 320 ft., two stories, of brick and concrete construction. The equipment in the plant includes many machines of special design and all machines are electric motor driven.

The Hemmeter Cigar Company has plans under way for the erection of a new seven-story manufacturing building. The new factory will be equipped with modern machinery and the company's output will be greatly increased.

The Anderson Carriage Company, manufacturer of electric automobiles, will build a two-story addition to its present plant at Milwaukee Junction.

The Everett-Metzger-Flanders Company has let the general contract for the erection of a two-story brick addition to its present factory to H. R. Haberkorn.

The Michigan Sanitary Paper Cup & Milk Bottle Company has been incorporated with a capital stock of $100,000. The principal stockholders of the new company, which will manufacture paper receptacles of various kinds, are Alexander Stevenson, John Stevenson and Andrew H. Weber.

The Welch Automobile Company will move its plant from Detroit to Saginaw, Mich., and will combine with the Marquette Automobile Company of the latter city. Both companies are the property of the General Motors Company and the move is made for factory economy.

The Ross-Heaton Mfg. Company, Richmond, Va., has been purchased by Detroiters and the plant and machinery dismantled and removed to this city. A new company with $50,000 capital stock has been organized here to take over the business of Charles S. Tolsma. C. B. Whitman and C. J. O'Hara being the principal stockholders. The company manufactures automobile curtain fasteners.

Another automobile accessory company is being organized here by John W. Hubbard, F. C. Steck and Thomas F. Ahearn, to be known as the Hunter Auto Lock Company. The capital stock is given at $25,000.

The Superior Bed Springs Company has been incorporated with a capital stock of $3,000 to manufacture bed springs. The principal stockholders are William J. Klein and Charles Holland.

The board of control of Ionia Prison, Ionia, Mich., has appropriated $25,000 to erect and equip new shops at the prison, to replace those destroyed recently by fire. A sprinkler system will be installed throughout the new buildings.

The Peerless Fence Company, Adrian, Mich., has perfected plans for increasing the facilities of the factory by the installation of an electro-galvanizing plant. The new building will be one story, 90 x 100 ft. and of saw-tooth design.

The Atlas Drop Forge Company, Lansing, Mich., has increased its capital stock from $100,000 to $200,000 to take care of a steady increase in business. The company has enlarged its plant twice within the past year.

The Marshall Lumber Company has taken over the holdings of the Calumet & Hecla Mining Company at Shelldrake, Mich., and will spend a large amount in equipping a sawmill at that place.

The Michigan Sugar Company is making extensive additions to its plant at Alma, Mich., including the erection of a new dryer house. New drying, cutting and granulating equipment and a 200-hp. engine will be installed in the new buildings.

The Lowell Specialty Company, Lowell, Mich., is preparing to build an addition to the present plant. The new building will be of brick construction 32 x 100 ft. and will be used for the manufacturing of sprayers and cream separators.

The Grayling Wood Products Company, Grayling, Mich., has broken ground for a chemical plant which will be the largest in the State, it is claimed. The new company, which has a capital stock of $50,000, will manufacture wood alcohol, turpentine, acetates, tar, etc.

The Armour canning plant at Big Rapids, Mich., is to have extensive improvements in the line of motor-driven machinery, according to L. J. Stimpson, manager of the plant.

Hector MacKay, president of the Rosedale Creamery Company, Sault Ste Marie, Mich., is contemplating the erection of a large sawmill near that city.

The Board of Trade of Ithaca, Mich., has purchased the site and plant formerly occupied by the Armour Tub Company and is negotiating with a Chicago concern for the removal of its business to Ithaca to occupy the vacant factory.

The Michelson Lumber Company's mill at Michelson, Mich., was destroyed by fire at a loss of $50,000. The mill will be rebuilt because of the large tracts of timber owned by the company in the vicinity.

Ground is being broken for the erection of the new manual training high school at Saginaw, Mich. The new school will be equipped with the most modern machinery obtainable for manual training work.

The Nelson Bros.' gasoline engine and pump jack factory, now located at Alma, Mich., will be removed in the near future to Saginaw, Mich., in order to secure larger factory quarters. The firm plans to greatly increase the capacity of the plant.

The Havers Motor Car Company, Port Huron, Mich., is planning to increase its capacity and to enlarge its plant to facilitate the handling of its rapidly growing business.

The Pere Marquette Railroad Company has let contracts aggregating $75,000 for the installation of a new heating, lighting and water system on the property in Saginaw, Mich., and for the erection of a new power house in that city.

The Runyan Gas Company, South Haven, Mich., which recently secured gas franchises at Otsego, Allegan and Plainwell, Mich., is reported to be ordering supplies and equipment for its new plants.

The new Hawthorne Paper Company, which recently incorporated at Kalamazoo, Mich., with a capital stock of $200,000, has awarded the contract for the erection of its new factory to the Frank Flaitz Company, of that city. The building will be of steel with reinforced concrete and mill construction and will consist of a finishing building 52 x 200 ft., four stories, a beater building 70 x 136 ft., three stories, a bleach building 50 x 50 ft., three stories, a machine building 66 x 200 ft., two stories, and an engine house and boiler house both 46 x 56 ft. and two stories. The new company will manufacture high-grade writing paper and

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will have one of the largest and most complete mills of its kind.

The Clarke-Carter Auto Company, Jackson, Mich., will begin the enlargement of its shops within the next few weeks and is planning the erection of another manufacturing building before long to take care of the rapidly growing business.

Fire which caused a loss of $10,000 at the Monroe Binder Board Company's plant, Monroe, Mich., damaged considerable machinery, including an electric lighting outfit consisting of an engine and generators, punch presses and calendar grinders.

The city of Menominee, Mich., has under consideration the installation of a municipal sewerage pumping station and the extension of its sewer system.

Jackson and Battle Creek capitalists have organized a company with a capital stock of $50,000 for the purpose of mining coal in Calhoun County, Mich. The company is said to have a very valuable property. C. W. Sellers, Battle Creek, and T. J. Hanlon, Jackson, are among those interested.

Coldwater, Mich., is to have a cement-products plant which is being organized by John and William Elliget, of that city. The company will be known as the Coldwater Cement Block Company.

Benton Harbor, Mich., has issued $100,000 of factory bonds, the proceeds of which will be used in financing the location of new industries in Benton Harbor, and a campaign in that direction will be started by the City Development Company.

The Commonwealth Power, Railway & Light Company, Jackson, Mich., which controls most of the electric power plants in southern Michigan, has under way the development of power from the waterflow of the Au Sable River, and is constructing a dam and plant on the lower Au Sable. The plant will have a capacity of 13,500 hp. and the current will be transmitted on the largest transmission line in the world to a substation to be erected near Saginaw for use there and in Bay City. Another dam and plant will be started farther up the river upon the completion of the present work. This project will call for a heavy expenditure for equipment.

It is reported from Milan, Mich., that the Detroit Fireless Stove Company now located in Detroit will probably remove the plant to Milan and increase its capacity.

The South

LOUISVILLE, KY., July 25, 1911.

General reports indicate that business in most lines has considerably improved. While no marked increase in the volume of trade has been noted, a larger number of inquiries is being received, and the outlook is for steadily bettering conditions. Contractors' equipment, including concrete-mixing outfits, are in excellent demand, while the call for power machinery has shown improvement of late. Refrigerating plants are being contracted for freely, and in spite of the dullness in the lumber trade there is a good call for wood-working machines.

Structural iron manufacturers are commenting upon the demand for iron fire-escapes, which are being placed in number of factories, apartment houses, etc. The increase in the demand for these is believed to be due to the general agitation following disastrous conflagrations in the East several months ago, in which there was large loss of life.

The Fiscal Court of Jefferson County, at Louisville, has ordered the purchase of a pump, which will be used in connection with the water softener in use at the county jail. Address Jailer John R. Pflanz.

It has been learned that the Adams Fire Fighting & Instrument Company, which was incorporated in Louisville with $100,000 capital stock recently, will devote its attention principally to the manufacture of appliances for fighting forest fires. Decision regarding the erection of plant has not yet been made. C. M. Pate, Louisville, is in active charge of the company's business.

S. Weber & Son, Louisville, dealers in scrap iron, have purchased the old equipment at the pumping station of the Louisville Water Company for $20,000. There is about 1500 tons of material in the station. The equipment sold included the two old Cornish engines which have been in use for 50 years.

Capt. Brinton B. Davis, architect for the Inter-Southern Life of Louisville, will ask for bids on the structural iron work involved in the new 18-story building of the company in about a month. The specifications have not yet been completed, but it is estimated that from 900 to 1100 tons of material will be required. Details regarding the power equipment for the building are also being worked out.

The demand for ornamental iron work is excellent, according to a report of the Dow Wire & Iron Works, Louisville. Besides a number of local contracts the company is manufacturing the material for use on the Hillyer Trust Building, Atlanta, and the Elks Club, Atlanta. Contracts for many-step fire escapes are also being received.

The Louisville Drying Machine Company is busy, work for distilleries which have closed for the summer being plentiful. The outlook for the fall is especially good.

Many inquiries are being received by the Henry Vogt Machine Company, and though the volume of business being booked is not abnormally large, it is satisfactory for this time of the year. Business in both boiler and refrigerating equipment lines is good.

The Crescent Ice Company, Louisville, has purchased a Houston-Stanwood & Gamble engine from the Brandeis Machinery & Supply Company. The Bauer Engineering & Contracting Company, St. Louis, is installing a cooler tower. The Reilly Pump Mfg. Company, Louisville, has been given a contract for a pump of large capacity.

The Berea Lighting Company, Berea, Ky., has added a turbine engine and dynamo of General Electric Company manufacture to its equipment. Arrangements will be made to supply nearby communities with light and power.

The Crumley Hardware Company, Atlanta, a wholesale hardware house, is erecting a warehouse. It handles bars, sheets and other finished materials. Though a comparatively young concern, it is one of the most important jobbing houses in the Southeast.

Equipment is to be purchased at once by the Pioneer Coal Company, which has been formed to take over the property of the Edgemont Coal Company, in Bell County, Ky., and C. S. Neal is in charge of the operation. A power plant of large capacity, electric mining machinery, a shaker screen and other equipment will be installed. M. M. Budwell, J. B. Speed and other Louisville men are interested in the new developments.

The Consumers' Ice & Cold Storage Company, Lexington, Ky., is to erect an ice, power and lighting plant in that city. A site is now being secured, and work will be begun early in the fall. The ice plant will have a capacity of 100 tons a day. The estimated cost of the plant is $200,000. T. B. Satterwhite is president of the company.

The Dover Pearl Button Company has been formed at Dover, Ky., and machinery will be installed in a building which has been leased for the manufacture of buttons from mussel shells.

The Webster Stone Company, Irvington, Ky., is planning the installation of equipment, including an engine, crusher, etc., in a rock quarry near that point.

An additional pump is to be installed at the station of the Catlettsburg, Ceredo & Kenova Water Works Company, at Catlettsburg, Ky. Owing to poor fire protection facilities in Catlettsburg and Ashland, which is supplied by the same plant, the insurance authorities have recommended considerable improvements in the system.

J. M. Ross, Somerset, Ky., is securing machinery for the equipment of a plant to make machines for cutting cross-ties and bridge slabs according to a new method.

The New Bluegrass Canning Company, Owensboro, Ky., is to purchase machinery for installation in its new factory, which will take the place of that recently destroyed by fire.

W. O. Nelson and C. H. O'Brien, Guthrie, Ky., are planning the establishment of an ice factory. They are now operating a flour mill and electric light plant.

The St. Bernard Mining Company, Earlington, Ky., which operates the water system there, will install a new pump in the immediate future. New mains are also to be laid down and fire hydrants installed. Frank D. Rash is the engineer in charge.

The Vincennes, Washington & Eastern Traction Company, Vincennes, Ind., which recently increased its capital stock from $100,000 to $600,000, has begun construction work on its interurban line between Vincennes and Washington. It will build its own powerhouse, but may make arrangements with the Vincennes Traction Company for the use of the latter's tracks in that city.

Contracts will be let this week by the city of Mc-

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Kenzie, Tenn., for the construction of the water-works and electric plant in that city. C. H. Jenks, Union City, Tenn., is the engineer in charge.

The Nashville, Tenn., branch of the Ahrens & Ott Mfg. Company has installed the largest steam pump ever sold in Nashville in the city pumping station. The company has the contract for the heating plant of the West Side Hotel at Lebanon, Tenn.

Owing to the failure of a bill providing for a municipal bond issue to pass Memphis, Tenn., will not be able to construct an electric light plant.

Plans are being made at Johnson City, Tenn., for the construction of a water-works system which it is estimated will cost $375,000. The plant will be built by the municipality.

The Georgia Power Company, which is erecting a hydro-electric plant at Tallula Falls, has asked for a franchise to do business in Chattanooga, Tenn. The officers of the company state that they will be able to generate 150,000 hp.

The Nashville, Tenn., Gas & Heating Company has been incorporated with $100,000 capital stock by J. H. Fall, Edwin A. Prife, C. H. Brandon, and others, for the purpose of taking over the plant of the Nashville Gas Company, which will be improved and enlarged.

The Murfreesboro Water Works Company, Murfreesboro, Tenn., is in the market for 15,000 ft. of pipe, mostly 4- and 6-in. Other improvements in the system are to be made.

The Bluegrass Phosphate Company will erect a large mill near Centreville, Tenn., in the near future. The company, which is now in progress of organization, will have a capital stock of $200,000. A. H. Grigsby, Centreville, is one of those interested.

The power-house of the South Pittsburgh Electric Light & Power Company, South Pittsburg, Tenn., was burned recently with a loss of $6,000. The building and engine in which the plant was installed were the property of the United State Cast Iron Pipe & Foundry Company, which suffered $8,000 loss. The electric light plant is to be rebuilt at once.

McDonald Bros., Rogersville, Tenn., are to be awarded a franchise for the sale of light and power in Rogersville. They plan the construction of a power plant on Holston River, three miles from Rogersville. It is planned to construct an interurban traction line after the power plant has been built.

W. A. Voss, Columbia, Tenn., plans the establishment of a steam laundry at Lewisburg, Tenn.

David Getaz, Son & Co., Knoxville, Tenn., are in the market for electric generators, engines and other power machinery.

William R. Wiley & Co., Roanoke, Va., plan the equipment of a machine shop, and are in the market for machine tools, as well as power transmission machinery.

An electric light plant, water works and ice factory are to be built at Vivian, La., by the Vivian Ice, Light & Water Company. O. C. Jacobs, of Oklahoma City, Okla., is president of the company, which has a capital stock of $50,000.

The municipal electric light plant at Clarksdale, Miss., is to be improved as the result of the approval of a bond issue of $60,000.

The city of Hickory, Miss., is contemplating the establishment of an electric light plant.

The Boeuf River Land & Lumber Company has been formed for operations near Monroe, La. Operations, including a sawmill, shingle mill, etc., will be begun in the fall. A $100,000 capital stock has been provided for. Edward Sims is president of the company and J. S. Watson, secretary and treasurer.

The Kimball-Lacy Lumber Company, Arkansas City, Ark., contemplates the erection of a sawmill in that city, taking the place of one recently destroyed by fire.

The Laubenthal Lumber Company, Meridian, Miss., is contemplating the erection of a sawmill at Sunflower, Ala., with a capacity of 30,000 ft. a day.

The Industrial Light & Power Company, Alexander City, Ala., has been incorporated with $50,000 capital stock by Benjamin Russell, J. H. Henderson and O. C. Thomas.

Charles Henderson, Troy, Ala., is planning the erection of an electric light plant at Elba, Ala.

A bond issue of $75,000 may be approved at Clarksville, Ark., for the erection of an electric light plant and water-works system.

St. Louis

ST. LOUIS, MO., July 24, 1911.

The dullness of last week in the machine tool market continues, though the undertone of the situation is still optimistic. During the week some fair orders, in a small way, have been placed and it can truthfully be said that business has not fallen off. Nevertheless the hope of improvement is still present, though just when it will come or from what direction is not yet determinable. Considerable has been heard of plans for new equipment, etc., over the St. Louis district, but the present difficulty lies in the fact that none of this has developed into actual inquiries or the submission of lists for quotations.

The improvements and additions to the plant of the American Brake Company on North Broadway are being pushed and the buildings are nearing the point where the installations of the new machinery can begin.

The Bignall & Keeler Mfg. Company, maker of pipe machines, reports that the demand for its product is such as to keep the plant fully occupied.

The Oliver Chilled Plow Company, South Bend, Ind., has let a contract for the erection of a six-story building on North Broadway in the agricultural implement district and it will be equipped with considerable machinery in addition to that now in operation at its present plant at Twenty-second street and Scott avenue. The building is to be completed January 1.

The city of Kirkwood, a suburb of St. Louis of about 10,000 population, has determined to construct a municipal electric lighting plant as soon as the formalities preceding a bond issue can be completed.

E. J. Nugent, Louisville, Ky., in conjunction with St. Louis and Louisville capitalists, has completed arrangements for the incorporation of a $250,000 company which will build an automobile tire manufacturing plant in St. Louis. Property has been selected for the site of a plant which will employ about 400 hands. The company will be known as the Gregory-DeHart Spring Tire Company.

The Matthews-Davis Tool Company has optioned a new site upon which to erect a new factory for tool manufacture. The building will be 100 ft. front, the height not yet having been determined.

Definite plans have been completed for the construction of a $200,000 addition to the David Ranken School of Mechanical Trades in St. Louis, which will be fully equipped with modern machinery for the practical instruction of the students. The building will be 125 x 225 ft., three stories. The school graduated its first complete class this year and has already found that its graduates are acceptable to the union labor organizations as well as practical and capable to handle work in their lines of study alongside experienced workmen who have developed from apprenticeships.

J. E. Leonard, Springfield, Mo., is planning to build a $200,000 stove manufacturing plant. A site for the factory has already been secured.

William Fennel, Moberly, Mo., manufacturer of carriages and wagons, is about to erect a new factory.

The Hopkins Billing Machine Company, St. Louis, Mo., has arranged to occupy a six-story building in that city which it will equip at once.

Eastern Canada

TORONTO, ONT., July 22, 1911.

Nearly all varieties of industry are contributing to the demand for equipment. Outfit for railroad contractors is not called for very strongly on account of Eastern construction, which is not at present extensive, and such movable plant is largely imported from the United States to supply the extensive demand on Western account. For practically every other class of machinery the demand is well maintained. Assuredly there never was a time when the wear and tear of manufacturing machinery was so great in Canada as it is today. Consequently, the orders for renewal are quite a steady source of business for makers and sellers. That the demand on account of new undertakings will be much greater some months hence is extremely probable. By that time the crop movement will have been financed. The banks will have recovered the money loaned on that account, and will therefore be in a position to give more liberal assistance to commercial customers with plans for increasing their business so as to share in the fruits of the country's enhanced prosperity.

THE MACHINERY MARKETS

Tenders are called for up to Aug. 4 for lock gates and valve gates for the Holland River Division of the Trent Canal, in Ontario. They should be sent to L. K. Jones, secretary of the Department of Railways and Canals, Ottawa.

The Montreal Light, Heat & Power Company will erect a gas meter house at Hockhelego, Montreal.

Contracts have been awarded for a new factory for the Sawyer-Massey Company, Hamilton.

The Diamond Flint Glass Company, Hamilton, Ontario, is having glass prepared for a new factory 150 x 300 ft., steel frame. Two glass furnaces are required.

The bulk of the machinery required for the $75,000 mill which is being put up at Montreal for the Dominion Flour Mills Company, Brantford, Ontario, is still to be supplied.

Up to July 30 tenders will be received for the construction of offices costing $34,000 for the Montreal Locomotive Works at Longe Pointe.

It is stated to be now beyond question that the Superior Pulp & Paper Company will build its $4,000,000 plant on the Canadian side of Sault Ste. Marie. The clearing of the site has been begun. The new building will be 180 x 500 ft., and will take 18 months to erect. A new coffer dam is being erected to augment the power now supplied the pulp mill, and the output of pulp will also be increased by another 50 tons per day, to supply the paper plants. A battery of 14 boilers is also to be installed in the old power house of the sulphide mill. The plant will employ about 300 hands. Bonds to the value of about $3,500,000 were floated in London several weeks ago. The industry, when completed, will represent an investment of $8,000,000.

The National Hardware Company is making an addition to its factory at Orillia, Ont.

Contracts have been let for the erection of four buildings as additions to the plant of the Page-Hersey Tube Works at Welland, Ont.

The British Electric Plant Company, Scotland, put in the lowest tender for the pumps required for Montreal's filtration plant.

A merger has just been effected of the Perrin Plow & Stove Company, Smiths Falls; the Tudhope-Knox Company, Orillia; the Tudhope-Anderson Company, Winnipeg, and the West Lorne Wagon Company. The new concern will be known as the Tudhope Company, Ltd. The headquarters will be at Orillia, and F. J. Oliver, chief shareholder of the Perrin Plow & Stove Company, will be manager. A large addition will be made to the Tudhope-Knox Company's plant at Orillia, and work has already been begun on it. The plow plant of the Perrin Company will be transferred from Smiths Falls to Orillia, but the stove plant will remain there and will be greatly enlarged.

The Nova Scotia Car Company, Halifax, N. S., has completed the improvement of its forge department. It has 17 oil furnaces now in operation, having found crude oil to be a more economical fuel than coal. Its gray iron foundry is also in operation. Machinery for the new steel car plant has arrived and is being installed. In October the building of steel cars will be begun at the plant.

The North American Smelting Company proposes to begin next month the erection of a lead smelter at Kingston, to cost $36,000. The company has been awaiting the building of the Canadian Northern line which will run directly through its property.

The MacDonald Mfg. Company, Stratford, Ont., is preparing to increase its manufacturing capacity by providing for an enlarged output of threshers.

The Beaver Board Company, Buffalo, N. Y., is negotiating for the purchase of a site in Ottawa upon which to erect a branch factory to employ several hundred men. The company expects to obtain its power at a lower price in Ottawa than the one ruling at Niagara Falls.

The North American Furniture Company has begun the construction of its plant at Owen Sound, Ont.

The Albert Mfg. Company, Hillsboro, N. B., has awarded to the Rhodes-Curry Company, Amherst, N. S., the contract for erecting its plaster mill on the site of the one destroyed some months ago. Buildings and machinery will cost about $100,000.

Application has been made for the incorporation of the Brockville Atlas Motor Company, with a capital stock of $200,000. T. J. Storey, of the Canada Carriage Company, Brockville, Ont., has taken the leading part in the enterprise. A site for the new company's factory has been secured in Brockville.

Western Canada

WINNIPEG, MAN., July 22, 1911.

Harvest operations will be in full tide throughout western Canada by the middle of next month. The activity in the fields will have some tendency to detract from the activity in business circles until the crop is off. The West is also beginning to feel the pressure of the banks upon customers who have become unduly committed to speculations in real estate. It would not cause much surprise if money became tight enough to cause a very sharp check in that speculation, and if some business men might be embarrassed by their land holdings. The long-continued strike at the coal mines of western Alberta and of the Crow's Nest Pass is also a drawback, and it now seems hardly possible for the country to get its winter stock of fuel from those mines this fall. Save for this strike and for the possible financial stringency referred to, the condition of the Canadian West is all that could be desired.

Contracts will soon be open to tender for the construction of a dry dock at Prince Rupert, B. C., for the Grand Trunk Pacific Railway Company. The estimated cost of the work on the lines of the plans now being prepared is $2,000,000. The company's agreement with the city requires work to be begun within three months. The company will increase its round-house capacity at Edson, Alberta, by 100 per cent.

The City Council of New Westminster, B. C., is in the market for the purchase of a steam roller and scarifier, and is about to call for tender for the laying of 12 miles of sewers, manholes to be included.

The rate-payers of Nanaimo have approved by-laws providing sewerage extensions and for privileges to the B. C. Hydraulic Power Company.

Plans are being prepared for a sewerage scheme by the municipality of Prince Rupert, B. C., the cost to be about $250,000.

The municipality of Penticton, B. C., will receive tenders up to August 10 for the installations of generators. The plant is to consist of two 100 k.v.a. 3-phase, 4600-volt, 900 r.p.m. alternating current generators directly connected to impulse wheels; about one mile of 10-in. pipe, one mile of 12-in. pipe, switchboards, transformers, meters, distribution and street lighting system.

The Anglo-American Warehouse Company is about to build a warehouse in Vancouver, B. C., to cost $60,000.

The Portland Cement Company, with a capital stock of $1,500,000, proposes to build a manufacturing plant on the Grand Trunk Pacific Railway line, 150 miles west of Edmonton. J. Clossosskil, Edmonton, Alberta, is the engineer. Specifications for the following have been prepared: Boilers, electric lights and power plant consisting of one 1000-kw. engine or turbine driven set, one 500-kw. engine or turbine driven set, two 40-kw. driven exciters.

Gordon, Ironsides & Fairs, of Winnipeg, have begun the construction of their large abattoir at Moose Jaw, Sask. The estimated cost is $2,000,000.

It is announced that the Pacific Electric Heating Company, whose headquarters are at Ontario, Cal., will establish a plant at Vancouver, B. C.

The B. C. Electric Railway Company has begun the erection of car repair works at its Chilliwacks Terminal point, near Vancouver.

MacDonald & Godson have established a structural ironworks plant at Barnet, B. C. They have obtained from the Vancouver City Council a contract to supply steel pipes for water mains amounting to $283,000.

The Morrison Mill Company, of Billingham and Blain, has purchased the plant and assets of the B. C. Mfg. Company, on Lulu Island, B. C. The company will erect a large new plant for the manufacture of lumber, boats, veneers and baskets.

The Cockshutt Plow Company has informed the City Council of Regina, Sask., that it will build a $50,000 warehouse in that city.

The Canadian Western Lumber Company is planning extensions of its plant at Fraser Mills, near New Westminster, B. C. A new sash and door factory and a shingle mill are to be added, the cost of construction and equipment to be $300,000.

The Inland Revenue Department of Canada has granted a license to the Western Power Company of Vancouver, B. C., to export 6500 hp. of electrical energy, in fulfilment of a contract with the Whatcom County Railway & Light Company, which supplies light and power to Bellingham and other towns in the State of Washington.

THE MACHINERY MARKETS

The Gordon Nail Company expects to have its plant for Calgary completed by September.

The McLaughlin Carriage & Automobile Company, Oshawa, Ont., has purchased a large site in Saskatoon, Sask., upon which it will erect a distributing warehouse for the portion of Canada west of Winnipeg.

The British Collieries, Ltd., with a capital stock of $5,000,000, and head office at Winnipeg, has been incorporated to carry on coal and other mining operations at Brazeau River, near Edson, Alberta. The provisional directors are: Edward Brown, chairman; H. W. Hutchinson, D. E. Williams, D. C. Cameron, J. S. Hough, D. R. Dingwall and F. S. Harstone, all of Winnipeg; James W. Haywarst and U. J. Tobin, of Vinton, Iowa.

At the annual meeting of the Saskatchewan Farmers' Elevator Company, held in Moose Jaw last week, it was decided to build at once a number of elevators at different points, to be ready for handling this fall's crop.

Consideration is now being given by the Commissioners of Calgary, Alberta, to the question of providing additional water supply for that city and another gravity line will be built up the Elbow River.

Chipman & Power, engineers, Toronto, are preparing a report on the installation of a water works system at Humboldt, Sask.

The city of Vancouver has passed a bylaw for water works extension to the amount of $1,000,000.

Prince Albert, Sask., has voted to spend this year $32,000 on its water works system.

The South Kootenay Power Company is putting in a sub-station near Grand Forks, B. C., and will construct four or five miles of transmission line for the purpose of supplying ranchers and orchardists in that district with power.

The City Council of Victoria, B. C., has appointed Wynn Meredith consulting engineer in charge of the Sooke Lake scheme of water supply.

The town of Kamloops, B. C., is preparing to spend $200,000 in developing power on the Barrier River, a tributary of the North Thompson River. The power will be conveyed 40 miles to Kamloops, where it will be utilized in connection with the water works system, and for industrial purposes.

The board of trade of Red Deer, Alberta, is securing an engineer to report on the water power that may be developed at a canyon on the Red Deer River, at a point six miles from the town.

Tenders are about to be called for to erect a foundry building for the Edmonton Iron Works, Edmonton, Alberta.

The Canadian Northern Railway Company has decided to erect its western shops at MacLeod, Alberta.

The Canadian Timber Investment Company, Ltd., Vancouver, B. C., has been incorporated to carry on business as saw and shingle mill owners, timber manufacturers, etc.

The Fort Fraser Land Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $500,000 to build and operate pulp and paper mills, factories, etc.

Texas

AUSTIN, TEXAS, July 22, 1911.

Cotton crop prospects in Texas could hardly be brighter. Generous rains in the past week have practically insured a large production in all of south and central Texas. In north Texas the drouth is completely broken. Business conditions are improving and the outlook for a record-breaking fall development in all industrial lines is very promising. In Arizona and New Mexico the demand for mining and irrigation machinery shows a good increase. The situation in Mexico remains chaotic and little will be done in that country in the matter of industrial development until after the October elections.

The Memphis Steel Company has the contract for the erection of a large steel standpipe at the White Rock reservoir for the municipal water-works plant at Dallas. The standpipe will have a capacity of 163,000 gal.

The City Commission of Fort Worth now has the plans and specifications for the proposed dam that is to be constructed to form a reservoir for the city's water supply and a pipe line to run from the reservoir to the city ready. It is estimated that the cost of the improvements will be approximately $1,000,000.

Plans are being arranged by local capitalists for the development of a natural gas field near Leuders, and the piping of the fuel to Abilene, a distance of 25 miles. The Commercial Club of Abilene is interested in the proposition.

J. P. Collier, of Amarillo, and associates, are promoting the organization of a company that will have a capital stock of $150,000 to build a plant for the refining of salt that they will mine near Adrian. The salt stratum is said to be 170 ft. thick and to cover a large area of territory.

Henry M. Wallace and associates, of Detroit, Mich., have let the contract for the erection of a gas plant and the construction of a distributing system at Temple, Texas, to cost $100,000.

The Farmers' Gin Company is erecting a cotton gin at Mount Pleasant to cost $5,000.

The Mission Land Improvement Company has promoted the construction at Mission of a system of water works and the installation of an ice and electric-light plant. For the water works system a 50,000-gal. reservoir will be constructed and a 50,000-gal. steel standpipe erected. A pumping plant will also be installed.

The People's Ice Company will install an ice factory and cold storage plant at Bowie.

The City Council of Cuero contemplates the erection of a second steel standpipe for reservoir water for fire protection.

J. S. McKinley will establish a broom factory at Orange.

The Fort Worth Power & Light Company that was recently formed with a capital stock of $3,540,000, has formally taken over the holdings of what was known as the J. R. Nutt syndicate in Fort Worth, embracing electric-light plant, street railway and valuable franchises. Among the directors of the new company are J. R. Nutt, of Cleveland, Ohio; George T. Reynolds, T. B. Yarbrough, W. C. Stripling, John P. King and A. J. Duncan, of Fort Worth.

Maurice Clark, of Oaxaca, Mexico, is promoting the installation of a large hydroelectric plant in the Tomellin canyon, in the State of Oaxaca. He has already secured a large number of provisional contracts for power in the mining districts within a radius of 100 miles of the proposed plant. In these contracts he agrees to commence furnishing power not later than the beginning of 1914.

Andrew Mackenzie, of Pachuca, Mexico, has his plans well advanced for the installation of a large hydroelectric plant in the State of Hidalgo. He will utilize the waters of the Tula and Moctezuma rivers for generating the electric power. The particular purpose of the proposed plant is to provide power for the operation of the machinery of the mines and mills of the Zimapan district.

An election of the taxpayers of Nogales, Ariz., will be held October 10 for the purpose of determining whether or not bonds shall be issued for the construction of municipal water works and sewer systems. It is estimated that the proposed water works system will cost about $100,000 and the sewer system $60,000.

J. H. Bell, of San Antonio, will install an ice factory and electric-light plant at Floresville.

E. C. Clark, of Chicago, is arranging to install an electric-light plant and ice factory and a water works system at Menard.

The Cameron Lumber Company will rebuild its lumber mill at Saron that was recently destroyed by fire. The mill will be equipped with modern machinery of a single-circle saw type, and will have a cutting capacity of 75,000 ft. per day.

The Magnolia Oil Company is preparing to erect at Galveston four storage tanks each of 15,000 gal. capacity, and also a distributing station. M. C. Bowedn has the contract.

The Farmers' Gin Company has been formed at Donna with a capital stock of $5,000. The incorporators are J. C. Hardison, S. J. Smallwood and Hill Hooks.

The Frenka-Kickler Gravel Company has been formed at Houston with a capital of $16,000. The incorporators are Joseph V. Frenka and Henry Kickler, of Fayetteville, and Millia Kneblik, of Houston.

The American Rio Grande Land & Irrigation Company, of Mercedes, is extending its irrigation canal system for the purpose of bringing an additional tract of 6000 acres under cultivation. Three miles of main canal and 35 miles of laterals will be constructed at a cost of about $100,000.

THE MACHINERY MARKETS

Preliminary steps have been taken looking to forming the Llano Grande Improvement district in Hidalgo County. The district will embrace about 90,000 acres of land, which will be drained by means of ditches that will be dredged. The cost of the work will be about $125,000. George B. Merriweather, engineer, Donna, was appointed by the Board of County Commissioners to investigate the project and make a report on same.

Richard Honey, Pachuca, Mexico, who is negotiating for the purchase of the plant of the Mexica Car & Foundry Company at Hutchinson, Mexico, now in the hands of a receiver, is promoting the erection there of a large iron and steel works in connection with the car manufacturing plant. A number of Americans and Mexicans are associated with Mr. Honey in the proposed enterprise. They have acquired large iron ore deposits in southern and central Mexico and development work is now in progress upon some of these properties. Mr. Honey is also owner of the iron works at Zimapan, Hidalgo, which is operated under the name of Negociacion Manufacturera de Fierro.

Dr. F. S. Pearson, of New York, head of the British syndicate which owns lumber mills at Madera and Pearson, state of Chihuahua, and a tract of 3,000,000 acres of timber land in that state, as well as the Mexico & Northwestern Railroad and a large electrical enterprise in Mexico, announces that he and his associates have adopted plans for the erection of paper mills, a box factory, sash and door factory and interior finish factory in El Paso. The proposed industrial plants will cost about $2,500,000. Hiram Smith, manager of the lumber department, with headquarters at Madera, Mexico, will attend to the details of the work.

The federal government of Mexico will soon begin the construction of an important extension of the drainage system of Mexico City.

The Pacific Coast

SAN FRANCISCO, CAL., July 18, 1911.

Orders for large tools are being placed with increasing frequency, and in some cases of late a considerable number of tools has been taken by one concern. New inquiries are still of a rather scattering nature, however, and no very steady demand can be counted on. The bulk of the business is made up of small orders for immediate delivery out of stock, and the merchants who cater to this trade regard conditions as about normal. Considerable buying is being done by oil well supply firms, one of them having recently placed an order for eight oil-tool lathes. The Corliss Gas Engine Company, recently reorganized, has ordered quite a lot of tools for shipment from the factories, and the Judson Mfg. Company, which recently took the structural contract for the Oakland city hall, has purchased a number of punches and other structural tools. Railroad inquiries which have been expected have not materialized, though it is known that new equipment is badly needed at several of the coast railroad shops.

Woodworking machinery is not in much demand. A few machines are being installed in local cooperage shops, in preparation for the wine season, but this business is of a small nature. Several substantial orders have been placed for mining equipment, and continued activity is expected in this line. Power pumps of the stock designs of local shops are in strong demand, and gas engine manufacturers are getting a good volume of export, as well as local business.

The Pacific Light & Power Company, San Francisco, G. O. Newman, chief engineer, will have prepared in the near future plans and specifications providing for a 300,000-hp. hydro-electric plant.

W. S. Heger, who has been manager of the San Francisco and Los Angeles offices of the Allis-Chalmers Company for about two years, has tendered his resignation and has been succeeded by Fred L. Webster. Mr. Heger is a pioneer in the coast machinery business, having opened a local office for the predecessor of the General Electric Company in 1889. He also established the San Francisco office of the Westinghouse Electric & Mfg. Company, in 1895, and was coast manager for that company until 1905. His successor has been manager of the Seattle office. The territory hereafter covered by the San Francisco office of the Allis-Chalmers Company will extend from the Mexican boundary to Alaska. M. C. Miller, assistant to the president of this company at the Milwaukee office, arrived here a few days ago.

The Union Iron Works is doing considerable marine work at present. Oil burners are being installed in a number of steamers plying between Pacific ports, and the army transport Sheridan will be placed on this company's dry dock next week.

The California Harbor Board has purchased a pile driver hoist from the Joshua Hendy Iron Works, and a compressor and pneumatic drill outfit from Harron, Rickard & McCone.

Considerable machinery is being shipped east from the Balaklala Copper Company's smelter at Coram, Cal., which has been closed for an indefinite period.

An electric air compressor has been installed at the Tightner mine in Sierra County, Cal., and an order for a 10-stamp mill has been placed with the Miners' Foundry, Nevada City, Cal.

The Edison Electric Company will shortly begin work on a new power plant at Colton, Cal.

The United Engineering Works, this city, has just completed a steel steamer for the immigration service.

The contemplated improvements at the pottery plant at Gladding, McBean & Co., Lincoln, Cal., includes a 3-ton traveling crane with a 75-ft. span,

The Halifax-Tonopah Company, Tonopah, Nev., is preparing to install a large electric hoist at its mine.

The Stevenson Ladder Company, Riverside, Cal., is installing a plant for the manufacture of ladders and fruit growers' supplies.

The Fulton Marine Construction Company and the Brundage Paint Company of Los Angeles, have consolidated as the San Pedro Marine Construction Company, and will increase the capacity of the boat shops.

The American Gas Engine Company is negotiating for a factory site at Ventura, Cal.

The Vulcan Iron Works, San Francisco, is installing a lot of compressors and general refrigerating machinery in the precooling plant of the Pacific Fruit Cooling & Vaporizing Company, Lodi, Cal.

The Backus Automatic Gas Machine Company has been incorporated at Los Angeles, with a capital stock of $25,000, by H. Brocker, L. T. Mayo, E. F. Hammel, V. Myers and F. E. McNamee.

The St. Gothard Consolidated Gold Mining Company, North Columbia, Cal., is planning to install a hydro-electric plant.

The Standard Brass Casting Company of Oakland is taking figures on the erection of a new foundry building.

Arrangements are being made for the erection of a large mill for the Inspiration Copper Company, near Globe, Ariz.

The Pacific Gas & Electric Company has let contracts for a new gas plant at Sacramento, Cal.

The Atlas Shoe Company is preparing to install a factory at Bay Point, Cal.

New machinery is to be installed at the Union Oil Company's refinery at Port Harford, Cal., the old equipment of which is being shipped to a new plant in the oil fields.

The town of San Mateo, Cal., has taken bids on a centrifugal pump for a high-pressure fire protection system.

The North Arizona Gas Company, Los Angeles, will put in a new gas plant shortly at Kingman, Ariz.

Government Purchases

WASHINGTON, D. C., July 24, 1911.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids August 12 for one 12-in. electrically driven suction dredge for the United States Navy Yard, Charleston, S. C.

The Quartermaster, Madison Barracks, N. Y., will open bids August 16 for furnishing and installing one pump in the pumping plant.

The Department of the Interior, United States Reclamation Service, Fallon, Nev., will open bids August 1 for furnishing and delivering f.o.b. shipping point one revolving type drag line scraper excavating machine, built and fully equipped for electric operation, with 3-phase, 60-cycle, alternating current at 440 volts. D. W. Cole, project engineer.

The bids received June 15 for furnishing six 1,000,000-gal. pumps have been rejected by the Chief Quartermaster, Chicago, Ill. The purchase will not be made at this time.

A patent on a delivery mechanism of a billet-heating furnace was granted July 11 to Jerome R. George, Worcester, Mass., and assigned to the Morgan Construction Company, Worcester. The patent number is 997,494.

Current Metal Prices.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report

IRON AND STEEL—

Bar Iron from Store—

Refined iron:
1 to 1⅛ in. round and square.... ₩ lb 1.70¢
1½ to 4 in. x ⅝ to 1 in.....
1½ to 4 in. x ¼ to 5-1 ..... ₩ lb 1.80¢
Rods—⅝ and 11-16 round and square. ₩ lb 1.80¢

Angles:	Cts. ₩ lb.
3 in. x ¼ in. and larger	1.90¢
3 in. x 3-16 in. and ⅛ in.	2.30¢
1½ to 2½ in. x ⅛ in.	2.05¢
1½ to 2¾ in. x 5-16 in. and thicker	1.95¢
1 to 1¼ in. x 3-16 in.	2.05¢
1 to 1¼ x ⅛ in.	2.10¢
⅞ x ⅛ in.	2.20¢
⅞ x ⅛ in.	2.25¢
⅞ in. x ⅛ in.	3.45¢
⅞ x 3-32 in.	3.90¢
Tees:	
1 in.	2.35¢
1¼ in.	2.20¢
1½ to 2½ x ¼ in.	2.00¢
1½ to 2½ x 3-16 in.	2.10¢
3 in. and larger	2.95¢
Beams	1.90¢
Channels, 3 in. and larger	1.90¢
Bands—1¼ to 6 x 6-16 to No. 8	2.10¢
Burden's "H. B. & S." iron, base price	2.95¢
"Burden's Best" iron, base price	3.15¢
Norway bars	3.60¢

Merchant Steel from Store—

	per lb
Bessemer machinery	1.90¢
Toe calk, tire and sleigh shoe	2.50@3.00¢
Best cast steel, base price in small lots	7¢

Sheets from Store—

Black

	One pass, C.R. soft steel.	R. G. cleaned.
No. 16	₩ lb 2.45¢	2.75¢
Nos. 18 to 20	₩ lb 2.50¢	2.85¢
Nos. 22 and 24	₩ lb 2.55¢	2.95¢
No. 26	₩ lb 2.60¢	3.05¢
No. 28	₩ lb 2.95¢	3.30¢

Russia, Planished &c.

Genuine Russia, according to assortment ..... ₩ lb 12 @14½
Patent planished, W. Dewees Wood ..... ₩ lb A, 10¢; B, 9¢ net

Galvanized

Nos. 12 and 14 ..... ₩ lb 2.75¢
No. 24 ..... ₩ lb 3.10¢
No. 26 ..... ₩ lb 3.30¢
No. 28 ..... ₩ lb 3.60¢
No 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized

Nos. 22 and 24 ..... ₩ lb 5.50¢
No. 26 ..... ₩ lb 6.00¢
No. 28 ..... ₩ lb 7.00¢

Corrugated Roofing—

2½ in. corrugated.	Painted.	Galvd.
No. 24 ₩ 100 sq. ft.	$3.75	$4.70
No. 26 ₩ 100 sq. ft.	2.85	3.90
No. 28 ₩ 100 sq. ft.	2.50	3.65

Tin Plates—

American Charcoal Plates (per box)

"A.A.A." charcoal:
IC, 14 x 20 ..... $6.65
IX, 14 x 20 ..... 7.90
A. charcoal:
IC, 14 x 20 ..... $5.60
IX, 14 x 20 ..... 5.70

American Coke Plates—Bessemer—

IC, 14 x 20.....107 lb $4.50
IX, 14 x 20 ..... 5.50

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating $8.70
IX, 20 x 28 with an 8 lb. coating 10.70

Seamless Brass Tubes—

List November 13, 1908. Base price, 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price, 18¢

Copper Tubes—

List November 13, 1908. Base price, 21¢

Brazed Brass Tubes—

List February 1, 1911. 19½¢ ₩ lb

High Brass Rods—

List February 1, 1911. 14⅝¢ ₩ lb

Roll and Sheet Brass—

List February 1, 1911. 14⅝¢ ₩ lb

Brass Wire—

List February 1, 1911. 14⅝¢ ₩ lb

Copper Wire—

Base price, Carload lots mill 14¢

Copper Sheets—

Sheet copper hot rolled, 16 oz. (quantity lots) ..... ₩ lb 18¢
Sheet copper cold rolled, 1¢ ₩ lb advance over hot rolled.
Sheet copper polished 20 in. wide and under, 1¢ ₩ square foot.
Planished copper, 1¢ ₩ square foot more than polished.
Sheet copper polished over 20 in. wide, 2¢ ₩ square foot.

METALS—

Tin—

Straits pig ..... ₩ lb 46 @47 ¢

Copper—

Lake ingot ..... ₩ lb 14 @14¼¢
Electrolytic ..... ₩ lb 13¾@14 ¢
Casting ..... ₩ lb 13¾@14 ¢

Spelter—

Western ..... ₩ lb 6⅝@ 7 ¢

Zinc—

No. 9, base, casks.. ₩ lb 8¢ Open.. ₩ lb 8⅛¢

Lead—

American pig ..... ₩ lb 5¼@5¼¢
Bar ..... ₩ lb 6⅝@6⅝¢

Solder—

½ & ½, guaranteed ..... ₩ lb .8¼@28⅝¢
No. 1 ..... ₩ lb 26¼@26⅝¢
Refined ..... ₩ lb 24⅝@25¼¢
Prices of solder indicated by private brand vary according to composition.

Antimony—

Cookson ..... ₩ lb..@10¼¢
Hallets ..... @10 ¢
Other brands ..... 9@ 9½¢

Bismuth—

Per lb $2.00@$2.25

Aluminum—

No. 1 aluminum (guaranteed over 99% pure), in ingots for remelting ..... 21¢ and 22¢
Rods and Wire ..... Base price 31¢
Sheets ..... Base price 33¢

Old Metals—

Dealers' Purchasing Prices Paid in New York.

	Cents.
Copper, heavy and crucible	10.75 to 11.00
Copper, heavy and wire	10.50 to 10.75
Copper, light and bottoms	9.50 to 9.75
Brass, heavy	7.25 to 7.50
Brass, light	5.75 to 6.00
Heavy machine composition	9.25 to 9.50
Clean brass turnings	7.00 to 7.25
Composition turnings	8.00 to 8.25
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	4.00

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depends on good mechanics. A good mechanic's success depends a great deal on the tools he uses. Give him a

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and you have a combination that cannot be equaled.

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